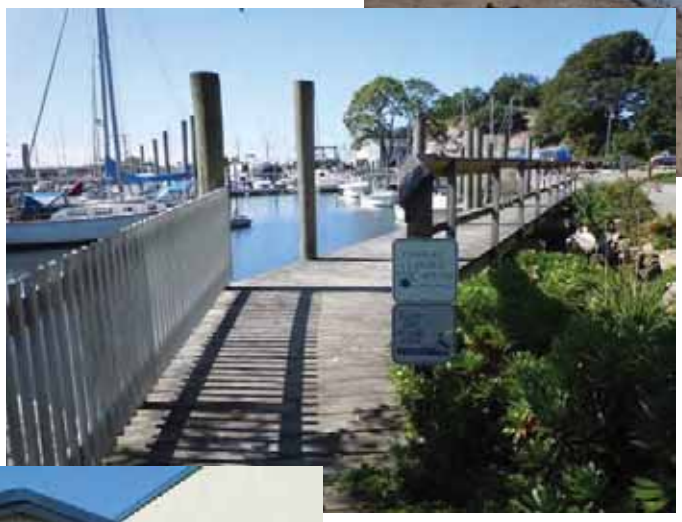
TOWN OF GROTON
MUNICIPAL COASTAL PROGRAM UPDATE

DRAFT
FEBRUARY 27, 2014

Prepared for:

Town of Groton
45 Fort Hill Road
Groton, Connecticut



Prepared by:

Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, Connecticut

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1

2.0 OVERVIEW OF APPLICABLE REGULATIONS 2-1

2.1 Federal 2-1
2.2 State of Connecticut 2-2
2.3 Town of Groton 2-9
2.4 Groton Long Point 2-12
2.5 Noank 2-12
2.6 City of Groton 2-12
2.7 United States Navy 2-13

3.0 PLANNING DOCUMENTS RELATED TO COASTAL MANAGEMENT 3-1

3.1 State of Connecticut 3-1
3.2 Town of Groton 3-3
3.2.1 Noank Harbor Management Plan (1992) 3-3
3.2.2 Groton Plan of Conservation and Development (2002) 3-5
3.2.3 Groton Long Point Plan of Conservation and Development (2006) 3-7
3.2.4 Parks and Recreation Master Plan (2009) 3-8
3.2.5 Preparing for Climate Change (2011) 3-9
3.2.6 Southeastern Connecticut Hazard Mitigation Plan (2012) 3-11

4.0 COASTAL MANAGEMENT ISSUES 4-1

4.1 Descriptions of Coastal Resources 4-1
4.2 Review of Issues in Previous Municipal Coastal Program 4-2
4.3 Development of Current Themes 4-3
4.4 Sea Level Rise and Coastal Resilience 4-4
4.5 Tidal Wetlands 4-30
4.6 Water-Dependent Uses 4-35
4.7 Public Access 4-36
4.8 Water Quality 4-44
4.9 Buffers and Setbacks 4-47
4.10 Density and Views 4-48
4.11 Open Space and Coastal Land Acquisitions 4-50
4.12 Program Administration 4-51

5.0 GEOGRAPHIC CONDITIONS, ISSUES, AND STRATEGIES 5-1

5.1 Navy Base 5-1
5.2 West Pleasant Valley 5-3
5.3 Airport Area 5-4
5.4 Poquonock Bridge and Bluff Point 5-7
5.5 Mumford Cove and Groton Long Point 5-8
5.6 Noank 5-11
5.7 Mystic 5-14
5.8 Old Mystic 5-18

6.0 PLAN IMPLEMENTATION 6-1

MAPS

Map 1-1 Coastal Management Area 1-2
Map 2-1 Zoning Map 2-11
Map 4-1 Coastal Flood Zones 4-8
Map 4-2 Hurricane Inundation Areas 4-9
Map 4-3 SuperStorm Sandy Inundation – Airport Area 4-10
Map 4-4 SuperStorm Sandy Inundation – Esker Point 4-11
Map 4-5 SuperStorm Sandy Inundation – Mystic 4-12
Map 4-6 Tidal Wetlands 4-31
Map 4-7 Coastal Public Access Areas 4-39
Map 5-1 Index of Coastal Subareas 5-2

TABLES

Table 4-1 Cross-Reference – Topics of the Initial Plan and Update 4-5
Table 4-2 Future Flood Scenarios Mapped by the Coastal Resilience Tool 4-17
Table 4-3 Downscaled Sea Level Rise Projections 4-18
Table 4-4 Impaired Waters 4-45
Table 6-1 Implementation Table 6-2

APPENDICES

Appendix A Recommendations from the Previous Municipal Coastal Program
Appendix B Area Plans for Airport, Esker Point, and Mystic

1.0 INTRODUCTION

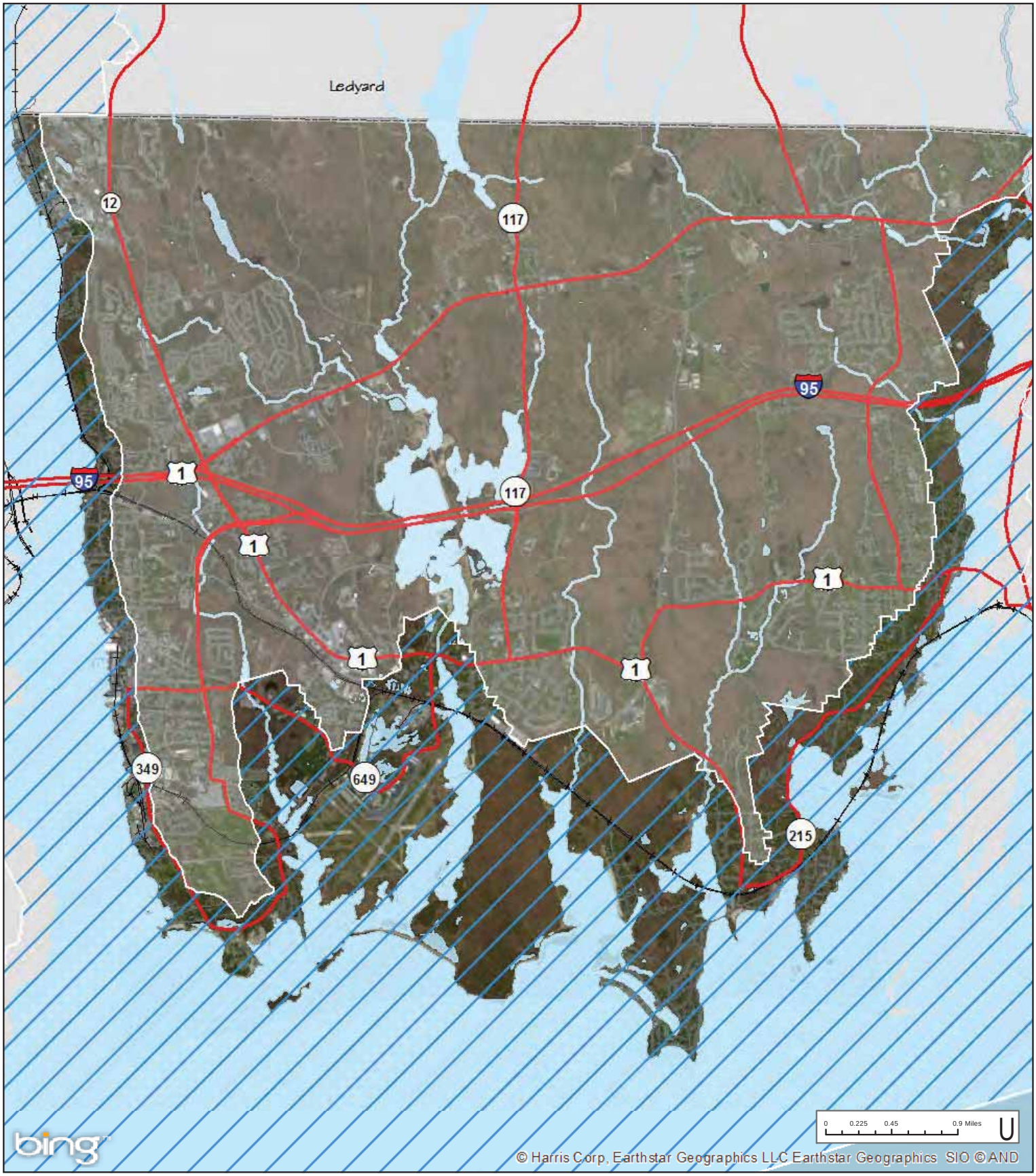
The Town of Groton is located in southeastern Connecticut at the eastern end of Long Island Sound. Fishers Island, New York lies only a few miles off the Groton shoreline, providing slightly more sheltered conditions to Groton. Almost all of the State's coastal resources can be found in the span of Groton's 20-mile shoreline, including developed areas, tidal wetlands, natural harbors, small beaches, coastal bluffs, and rocky shorefronts.

A significant portion of the historical and most densely developed parts of Groton lie southerly of the coastal boundary. This boundary roughly coincides with an imaginary line located 1,000 feet inland from tidal wetlands or the inland boundary of coastal flood hazard areas, or located 1,000 feet from the mean high water line, whichever is furthest inland. Refer to Map 1-1 for a delineation of the coastal boundary. The municipal subdivisions of the City of Groton, Groton Long Point, and Noank lie almost entirely in the coastal management area.

The Groton Municipal Coastal Program was adopted in 1982 in accordance with the Connecticut Coastal Management Act of 1979. This Act enabled municipalities to develop their own coastal management policies and document them in a plan. Groton's plan served as a guide to development within the coastal boundary, known herein as the coastal management area. The plan establishes objectives for coastal zone use and development, and articulates Town policies relative to the Connecticut Coastal Management Act. The plan forms the basis of the Town Planning Commission coastal site plan reviews, and is an essential part of the review of zoning applications, coastal land use decisions, and public investment priorities. These policies and review procedures are reflected in the Groton Zoning Regulations, Plan of Conservation and Development, and other plans that were developed after 1982.

Since 1982, the Town has vigorously pursued policies of coastal resource protection and appropriate development. For example, the Town has established a number of key public access improvements, helped improved coastal water quality, and promoted water dependent uses. Noank developed and implemented one of the state's first harbor management plans in 1992.

Although the 1982 Coastal Program has served the Town of Groton well, the Town desires a more visionary Coastal Program to guide public policy and regulation. Chapter 6 the previous Plan of Conservation and Development (2002), "Coastal Resources" states that *"due to the importance of the coastal area to Groton's character and quality of life, Groton has an important obligation to carefully manage these areas"* and recommends that Groton should *"Undertake a separate planning effort to review and update the 1982 Municipal Coastal Program, as needed."*



Groton, Connecticut

Plan of Conservation and Development

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

Legend

Coastal Management Area

Coastal Management Area Boundaries

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

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With this directive in place, the Town of Groton elected to update the original municipal coastal program in connection with the update of the Plan of Conservation and Development. The update of the municipal coastal program has included contributions from residents, stakeholders, neighborhood associations, municipal commissions, and municipal officials and staff through the process of updating the Plan of Conservation and Development.

The Coastal Program includes a review of relevant Federal, State, and local regulations and policies; a review of related State and local planning studies and documents; an overview of coastal management issues; discussions of existing land use and specific coastal issues in various coastal regions; and a presentation of recommendations. As such, the municipal coastal program is meant to be used as a planning tool and as a guidance document for development applications within the coastal management area. With the municipal coastal program in hand, the Town anticipates that developers and land use applicants will be better equipped to propose projects that fit in with existing neighborhoods, improve environmental conditions, provide public access to the waterfront, and increase water-dependent land uses.

2.0 OVERVIEW OF APPLICABLE REGULATIONS

This section presents the Federal, State, and local regulations related to coastal management and development.

2.1 Federal

The Coastal Zone Management Act (CZMA) was enacted on October 27, 1972, to encourage coastal States, Great Lake States, and United States Territories and Commonwealths to develop comprehensive programs to manage and balance competing uses of, and impacts to, coastal resources. The CZMA was amended several times, and most recently in 1990 and 1996. The CZMA declares that it is national policy:

(1) to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations;

(2) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as the needs for compatible economic development, which programs should at least provide for:

(A) the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone,
(B) the management of coastal development to minimize the loss of life and property caused by improper development in flood-prone, storm surge, geological hazard, and erosion-prone areas and in areas likely to be affected by or vulnerable to sea level rise, land subsidence, and saltwater intrusion, and by the destruction of natural protective features such as beaches, dunes, wetlands, and barrier islands,
(C) the management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters,
(D) priority consideration being given to coastal-dependent uses and orderly processes for siting major facilities related to national defense, energy, fisheries development, recreation, ports and transportation, and the location, to the maximum extent practicable, of new commercial and industrial developments in or adjacent to areas where such development already exists,
(E) public access to the coasts for recreation purposes,
(F) assistance in the redevelopment of deteriorating urban waterfronts and ports, and sensitive preservation and restoration of historic, cultural, and esthetic coastal features,

(G) the coordination and simplification of procedures in order to ensure expedited governmental decision making for the management of coastal resources,
(H) continued consultation and coordination with, and the giving of adequate consideration to the views of, affected Federal agencies,
(I) the giving of timely and effective notification of, and opportunities for public and local government participation in, coastal management decision making,
(J) assistance to support comprehensive planning, conservation, and management for living marine resources, including planning for the siting of pollution control and aquaculture facilities within the coastal zone, and improved coordination between State and Federal coastal zone management agencies and State and wildlife agencies, and
(K) the study and development, in any case in which the Secretary considers it to be appropriate, of plans for addressing the adverse effects upon the coastal zone of land subsidence and of sea level rise; and

(3) to encourage the preparation of special area management plans which provide for increased specificity in protecting significant natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making;

(4) to encourage the participation and cooperation of the public, state and local governments, and interstate and other regional agencies, as well as of the Federal agencies having programs affecting the coastal zone, in carrying out the purposes of this title;

(5) to encourage coordination and cooperation with and among the appropriate Federal, State, and local agencies, and international organizations where appropriate, in collection, analysis, synthesis, and dissemination of coastal management information, research results, and technical assistance, to support State and Federal regulation of land use practices affecting the coastal and ocean resources of the United States; and

(6) to respond to changing circumstances affecting the coastal environment and coastal resource management by encouraging States to consider such issues as ocean uses potentially affecting the coastal zone.

2.2 State of Connecticut

The CZMA emphasizes the primacy of State decision-making regarding the coastal zone. The DEEP Office of Long Island Sound Programs (OLISP) administers Connecticut's federally-approved coastal zone management program pursuant to the federal CZMA of 1972, as amended. OLISP is funded by the State of Connecticut and NOAA. The

NOAA Office of Ocean and Coastal Resource Management (OCRM) is responsible for nationwide coordination and implementation of the CZMA.

OLISP coordinates with programs within the DEEP regarding activities that may have an impact on Long Island Sound and related coastal land and water. OLISP implements, oversees, and enforces the State's coastal management and coastal permit laws and regulations, manages programs to protect and restore coastal resources and habitat, provides technical assistance and recommendations regarding local projects, and helps coastal towns to plan and implement programs to protect coastal resources and encourage water-dependent uses of the shorefront.

Connecticut's coastal management regulations are in Chapter 444 of the Connecticut General Statutes. Section 22a-101 of the statutes enables development of municipal coastal programs as follows (bold text added for emphasis):

a) In order to carry out the policies and provisions of this chapter and to provide more specific guidance to coastal area property owners and developers, **coastal municipalities may adopt a municipal coastal program for the area within the coastal boundary and landward of the mean high water mark.**

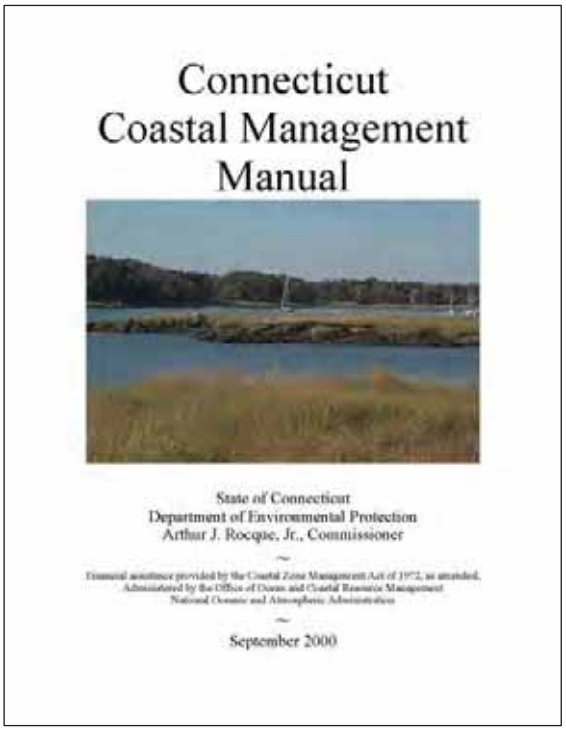
b) A municipal coastal program shall include, but is not limited to:

    a. Revisions to the municipal plan of conservation and development under section 8-23 or special act, insofar as it affects the area within the coastal boundary, such revisions to include an identification and written description of the municipality's major coastal-related issues and problems, both immediate and long-term, such as **erosion, flooding, recreational facilities, and utilization of port facilities** and to include a description of the municipal boards, commissions and officials responsible for implementing and enforcing the coastal program, a description of enforcement procedures and a description of continuing methods of involving the public in the implementation of the municipal coastal program;
    b. **revisions to the municipal zoning regulations** under section 8-2 or under special act and revisions to the following regulations and ordinances if the municipality has adopted such regulations or ordinances, and insofar as such regulations or ordinances affect the area within the coastal boundary: (A) Historic district ordinances under section 7-147b; (B) waterway encroachment line ordinances under section 7-147; (C) subdivision ordinances under section 8-25; (D) inland wetland regulations under subsection (e) of section 22a-42 and section 22a-42a; (E) sewerage ordinances under section 7-148; (F) ordinances or regulations governing filling of land and removal of soil, loam, sand or gravel under section 7-148; (G) ordinances concerning protection and improvement of the environment under section 7-148; and (H) regulations for

the supervision, management, control, operation or use of a sewerage system under section 7-247.

Connecticut Coastal Management Manual

The DEEP published the *Coastal Policies and Use Guidelines* manual in 1979 to guide coastal development. The *Connecticut Coastal Management Manual* replaced this guidance document in 2002.



The Manual contains a number of project review checklists, coastal resource fact sheets, coastal use fact sheets, site plan examples, and a copy of the Connecticut Coastal Management Act (CGS 22a-90 through 22a-112) as well as other regulations. Most importantly, the Manual describes **Coastal Site Plans** and explains when they must be referred by the local municipality to DEEP.

Connecticut Stormwater Quality Manual

The *Connecticut Stormwater Quality Manual* was published by DEP in 2004 for use as a planning tool and design guidance document. The manual provides uniform guidance for developers and engineers on the selection, design, and proper application of stormwater BMPs.

The *Connecticut Stormwater Quality Manual* specifically mentions or addresses coastal management in the following chapters and sections:

- *Chapter 1, Relationship of the Manual to Federal, State, and Local Programs; Federal Programs:* Coastal Zone Act Reauthorization Amendments – Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 is designed to address the problem of nonpoint source pollution in coastal waters. Under Section 6217, states and territories with approved Coastal Zone Management Programs, including Connecticut, are required to develop Coastal Nonpoint Source Pollution Control Programs.

- *Chapter 1, Existing Stormwater Management Programs in Connecticut:* The Coastal Management Act protects coastal resources and supports water-dependent uses, regulates development that impacts coastal water and resources, authorizes State and local regulations.

- *Chapter 1, Relationship of the Manual to Federal, State, and Local Programs; State Programs:* Connecticut Coastal Management Act – The Act establishes goals and policies for the protection of coastal resources. Under the Act, the Commissioner of DEP must coordinate all regulatory programs under his jurisdiction with permitting authorities in the coastal area, including those related to wetlands and watercourses, stream channel encroachment, and the erection of structures or placement of fill in tidal, coastal, or navigable waters, to ensure that permits issued under such regulatory authority are consistent with coastal management goals and policies.

- *Chapter 1, Relationship of the Manual to Federal, State, and Local Programs; State Programs:* Tidal Wetlands Act – The Act of 1969 gives DEP authority to regulate activities in tidal wetlands. The permitting program administered by OLISP requires that the applicant address possible impacts to coastal resources, including those associated with stormwater runoff, and discourages direct stormwater discharges to tidal wetlands.

- *Chapter 1, Relationship of the Manual to Federal, State, and Local Programs; State Programs:* Structures, Dredging, and Fill Act – This Act gives DEP the authority to regulate dredging, the erection of structures, and the placement of fill in tidal, coastal or navigable waters of the state waterward of the high tide line. The permitting program administered by OLISP requires that the applicant address possible impacts to coastal resources, including those associated with stormwater runoff, and discourages direct untreated stormwater discharges to tidal, coastal, or navigable waters.

- *Chapter 1, Relationship of the Manual to Federal, State, and Local Programs; Local Programs:* Coastal Management Act/Coastal Site Plan Review – Under the CCMA, coastal municipalities are required to implement Connecticut's Coastal Management Program through their existing planning and zoning authorities. Most activities within the coastal boundary require municipal CSPRs. In this review process, the applicant must describe the proposed project and identify coastal resources in the project area and potential impacts to those resources. Local planning and zoning authorities must decide whether potential adverse impacts to water quality or other coastal resources are acceptable. A description of stormwater management measures may be required depending on the size of a project and the municipality concerned. The Act allows coastal municipalities to develop Municipal Coastal Programs, which are revisions to plans of conservation and development and zoning regulations to focus on the coastal resources and coastal management issues unique to each town.

- *Chapter 7, Groundwater Recharge and Runoff Reduction:* Runoff Capture Volume – The objective of the runoff capture criterion is to capture stormwater runoff to prevent the discharge of pollutants, including unpolluted fresh water, to sensitive coastal receiving waters and wetlands. The runoff capture criterion applies to new stormwater discharges located less than 500 feet from tidal wetlands, which are not fresh-tidal wetlands. The stormwater runoff volume generated by the first inch of rainfall must be retained on-site for such discharges. The runoff capture volume criterion is consistent with DEP coastal management policy and stormwater general permit requirements.

- *Appendix C, Model Ordinance:* Model Ordinance for Stormwater Management – It is documented that improperly managed stormwater flows do make significant contributions to coastal pollution, resulting in hypoxic (low dissolved oxygen) conditions and increases in pathogens, toxic contaminants and floatable debris. Therefore, improved stormwater management and treatment will result in decreases in these pollutants. Thus, Public Acts 91-398 was passed in 1991 to require, in part, that zoning regulations and plans of conservation and development adopted by coastal municipalities be made with reasonable consideration for greater protection of Long Island Sound water quality. In particular, the Act required municipalities to adopt regulations and plans with reasonable consideration and protection of the ecosystem and habitat of Long Island Sound and to design them to reduce hypoxia, pathogens, toxic contaminants and floatable debris in Long Island Sound.

An Act Concerning the Coastal Management Act and Shoreline Flood and Erosion Control Structures.

In 2012, the Connecticut General Assembly passed Public Act 12-101, An Act Concerning the Coastal Management Act and Shoreline Flood and Erosion Control Structures. This legislation combined a number of initiatives to address sea level rise and to revise the regulatory procedures applicable to shoreline protection. For the first time, the concept of sea level rise was incorporated into the Connecticut Coastal Management Act (CMA) relative to the general goals and policies of coastal planning. In particular, CGS section 22a-92(a)(5) lists the following goal: *"To consider in the planning process the potential impact of a rise in sea level, coastal flooding and erosion patterns on coastal development so as to minimize damage to and destruction of life and property and minimize the necessity of public expenditure and shoreline armoring to protect future new development from such hazards."*

From a regulatory standpoint, perhaps the most significant change brought about by PA 12-101 was the change in coastal permitting jurisdiction for statutes governing the placement of structures, dredging, and fill in tidal, coastal or navigable waters (CGS sections 22a-359 through 22a-363f, inclusive). Through its coastal permitting program,

OLISP has had direct regulatory jurisdiction over activities occurring in tidal wetlands since 1970 and/or waterward of the high tide line since 1987. Between 1939 and 1987, the state regulatory jurisdiction line for coastal structures, dredging, and fill was at Mean High Water, which also marks the boundary between private and public trust property.

Because the statute provided several methods of field-determining the jurisdictional high tide line, there were occasional disputes over the extent of OLISP's regulatory jurisdiction. As a result, effective October 1, 2012, the "high tide line" is changed to "coastal jurisdiction line" (CJL), which is a fixed elevation that can be derived by a surveyor in accordance with a specified methodology. The CJL was developed to roughly approximate the location of the high tide line that OLISP had been using, and will be adjusted to reflect sea level rise upon the promulgation of tidal data from the next tidal epoch.

The CMA already contained a number of strong policies encouraging the protection of natural shoreline sedimentation and erosion processes, and discouraging shoreline flood and erosion control structures (also known as "hard" structures or shoreline armoring, such as seawalls, bulkheads and revetments) except in certain specified conditions. Public Act 12-101 modified and explained several of these policies. In particular, houses built after 1980 but before 1995, and cemeteries were added to the list of uses for which erosion control structures may be authorized.

By law, the CMA requires coastal site plan reviews for certain activities at least partially in the coastal boundary and landward of the mean high water mark. A coastal site plan for a shoreline flood and erosion control structure must be filed with a municipal zoning commission to determine conformity with municipal zoning regulations and certain state statutory requirements. A shoreline flood and erosion control structure applicant must obtain any necessary DEEP approval for conducting a regulated activity in the state's tidal, coastal, or navigable waters waterward of the CJL.

Public Act 12-101 requires a municipal zoning commission to approve a coastal site plan for a shoreline flood and erosion control structure if the record demonstrates and the commission makes specific written findings that: 1) the structure is necessary and unavoidable to protect infrastructure facilities, cemetery or burial grounds, water-dependent uses fundamental to habitability or the property's primary use, or inhabited structures or additions constructed by January 1, 1995; 2) there is no feasible, less environmentally damaging alternative; and 3) all reasonable mitigation measures and techniques are implemented to minimize adverse environmental impacts.

The Act also allows the Commissioner of Energy and Environmental Protection to establish a pilot program to encourage "innovative and low-impact approaches to shoreline protection and adaptation to a rise in sea level. Such approaches may include living shorelines techniques utilizing a variety of structural and organic materials,

including, but not limited to, tidal wetland plants, submerged aquatic vegetation, coir fiber logs, sand fill and stone to provide shoreline protection and maintain or restore coastal resources and habitat."

Finally, PA 12-101 also contains a requirement for communities to consider Sea Level Rise in their Plans of Conservation and Development. This was detailed in the 2013 legislative session.

An Act Concerning Climate Change and Data Collection

Pursuant to Special Act 13-9, An Act Concerning Climate Change and Data Collection, the State of Connecticut will be establishing a "Center for Coasts" that will conduct research, analysis, design, outreach and education projects to guide the development and implementation of technologies, methods and policies that increase the protection of ecosystems, coastal properties and other lands and attributes of the state that are subject to the effects of rising sea levels and natural hazards. Specifically, the Connecticut Center for Coasts will undertake the following activities:

- Mapping exercises to assess and visualize key characteristics of shoreline resiliency, such as shoreline changes,
- Pilot-scale engineering and impact assessment studies,
- Consensus building efforts to determine state-wide uniform guidelines for planning and development purposes, including the expected rate of sea level rise for the next 100 years,
- Ways to develop state-wide, science-based planning and management alternatives,
- Development in science and information-based outreach and technology transfer programs for state and local agencies and officials involved in planning and development,
- An assessment of soft shore protection strategies in Long Island Sound and the development of instructional guides for the use of such soft shore protection strategies,
- A comprehensive coastal infrastructure inventory and risk assessment,
- An analysis of the impact of seawalls in urban and rural communities,
- The development of uniform, state-wide models that predict inundation flood scenarios under slow, constant sea level rise and under storm surges,
- Projects that lead to the development of rapid storm damage assessment technology,
- Developing design guidelines for the construction and repair of structural and nonstructural shore protection, and
- Developing tools for determining appropriate shore protection strategies and providing coastal protection information to a diverse range of end users.

The DEEP Office of Planning and Program Development and OLISP will be partnering with the University of Connecticut to pursue the Center for Coasts. DEEP and the

University shall deliver a work plan to the Connecticut General Assembly in 2014.

2.3 Town of Groton

Groton Zoning Regulations

In Groton, the Zoning Commission is charged with administering the Zoning Regulations. Current Zoning Regulations are effective November 2, 1987 and have been revised through 2013 to incorporate the DFIRMS adopted in 2013. Flood protection regulations are found in Section 6.6 and Coastal Resource Setbacks are found in Section 6.8. Section 6.6 is essentially the local articulation of the NFIP regulations. Groton's regulations are not more stringent with respect to construction of new structures, and freeboard is not required.

Section 6.8 of the Zoning Regulations, the Coastal Resources Setback section, prohibits new building construction, including minor additions to or modifications of existing buildings or detached accessory buildings, such as garages, utility sheds, pools, tennis courts, or parking lots within 50 feet of any of the following Coastal Resource Areas: coastal waters, tidal wetlands, coastal bluffs, escarpments, beaches or dunes. This section is believed moderately appropriate for facilitating disaster-resistant construction. The section does not apply to the Waterfront Design District or water-dependent uses.

Section 8.4-2 of the Zoning Regulations addresses the Coastal Site Plan Review. The following are required to undergo a Coastal Site Plan Review: Site plans submitted to the Planning Commission, subdivision plans submitted to the Planning Commission, plans submitted to the Planning Commission for a planned unit development, applications for a special permit submitted to the Zoning Commission, an application for a zoning variance submitted to the Zoning Board of Appeals, and a referral of a proposed municipal project to the Planning Commission.

Exemptions from the Coastal Site Plan Review are similar to those found in other municipalities, and include:

1. Minor additions to or modifications of existing buildings or detached accessory buildings such as garages and utility sheds except in instances where Section 6.8 is applicable.
2. Construction of new or modification of existing structures incidental to the enjoyment and maintenance of residential property including but not limited to walks, terraces, driveways, swimming pools, tennis courts, docks, and detached accessory buildings except in instances where Section 6.8 is applicable.
3. Construction of new or modification of existing on premise fences, walls, pedestrian walks and terraces, underground utility connections, essential electric, gas, telephone, water and sewer service lines, signs and such other minor structures as will not

substantially alter the natural character of coastal resources or restrict access along a public beach.

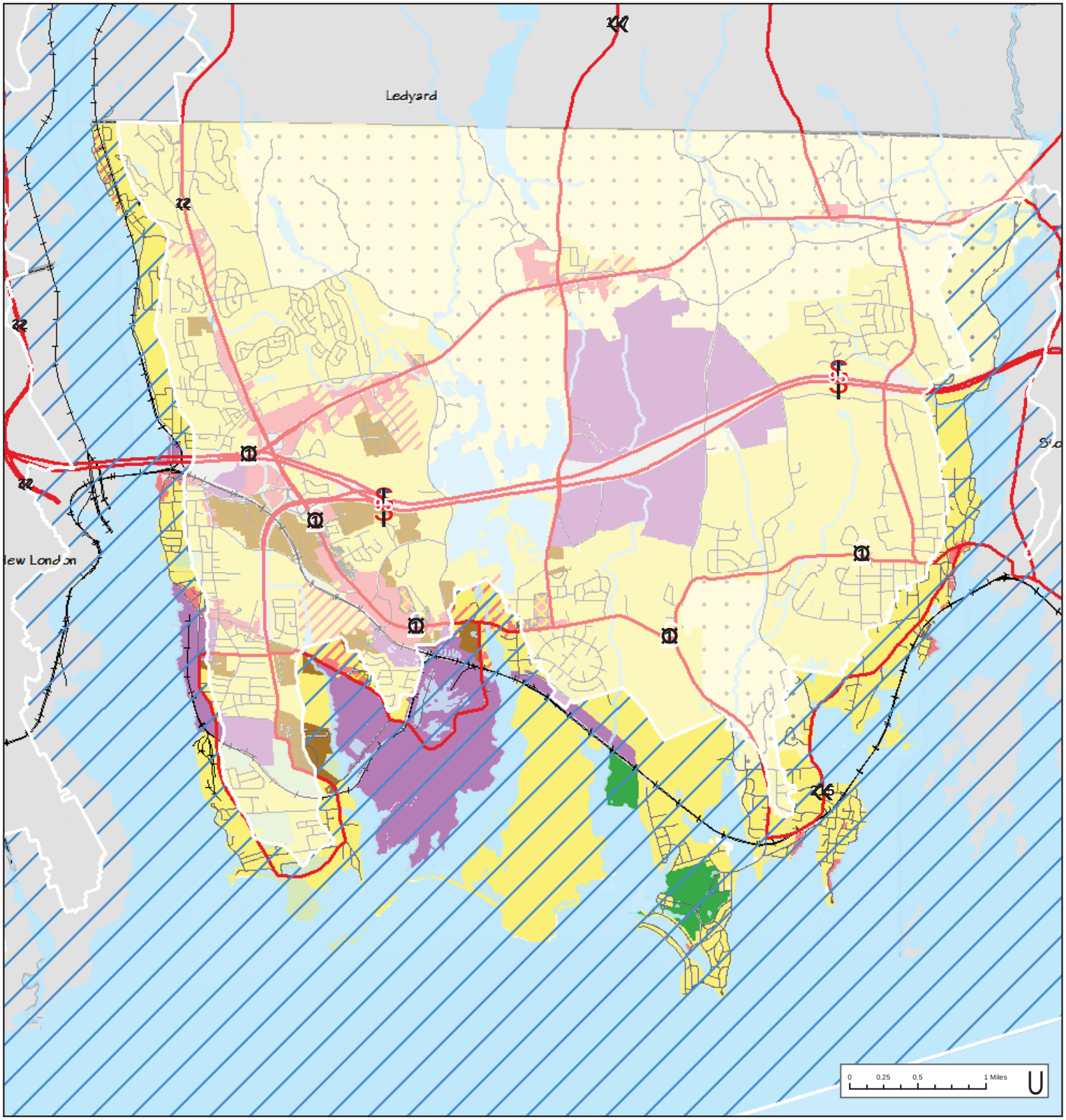
4. Construction of an individual conforming single family residential structure except in or within 100 feet of the following coastal resource areas as defined by Section 22a-93(7) of the Connecticut General Statutes: tidal wetlands, coastal bluffs and escarpments, and beaches and dunes.
5. Activities conducted for the specific purpose of conserving or preserving soil, vegetation, water, fish, shellfish, wildlife, and other coastal land and water resources.
6. Gardening, grazing, and the harvesting of crops.
7. Interior modifications to buildings.
8. Minor changes in use of a building, structure, or property except those changes occurring on property adjacent or abutting coastal waters.

As required by 8.4-2(C), a coastal site plan shall include a plan showing the location and spatial relationship of coastal resources on and contiguous to the site; a description of the entire project with appropriate plans indicating project location, design, timing, and methods of construction; an assessment of the capability of the resources to accommodate the proposed use; an assessment of the suitability of the project for the proposed site; an evaluation of the potential beneficial and adverse impacts of the project and a description of proposed methods to mitigate adverse effects on coastal resources. Any persons submitting a coastal site plan as defined above shall demonstrate that the adverse impacts of the proposed activity are acceptable and shall demonstrate that such activity is consistent with the goals and policies of Section 22a-92 of the Connecticut General Statutes.

Coastal Site Plan Review Process

The Planning Commission administers Coastal Site Plan reviews per Section 8.4-2 of the Zoning Regulations. Planning, Zoning, and Wetlands division staff are responsible for supporting the reviews of the commission and handling the administration of the applications. The Environmental Planner [is this correct?] is responsible for certifying that a building, use, or project located within the coastal zone has proceeded as approved.

The guidance sheet and form "Land Use Application – Coastal Site Plan" is provided to applicants in the Town of Groton for completing applications for coastal site plan reviews. This form is based on the DEEP model form, and contains the information required by DEEP for its parallel review. A zoning map is included as Map 2-1 on the next page.



Groton, Connecticut

Plan of Conservation and Development

Zoning Class by Group

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

Zoning

- Coastal Management Area Boundaries
- Commercial
- Industrial
- Mixed Use: Res/ COmm
- Mixed Use: Res/ Offic
- Open Space: Conservation
- Open Space: Recreation
- Right of Way
- Multifamily Residential
- Rural Residential
- Single Family Residential
- Two Family Residential

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

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2.4 Groton Long Point

Groton Long Point administers its own zoning regulations and has developed its own Plan of Conservation and Development. The Plan of Conservation and Development is discussed in Chapter 3.

2.5 Noank

Noank administers its own zoning regulations through a zoning commission. The five districts are:

- Village Residential, RV
- Moderate Density Residential, R-12
- Low Density Residential, R-20
- Rural Density Residential, R-40
- Village Commercial, VC
- Waterfront Commercial, WC

All five districts are located in the coastal management zone. The Waterfront Commercial district allows yacht clubs, docks, piers, wharves, boat repair and service yards, marine engine sales and repairs, boat rentals, boat sales, base operations for fishing, and fish and shellfish retail. Water dependent uses are allowed in the WC, RV, and R-20 districts, although the allowed uses in the RV and R-20 districts are limited to personal watercraft usage or a base for fishing or lobstering.

2.6 City of Groton

The City of Groton Planning & Zoning Commission oversees use and development of residential, commercial, and industrial land and the conservation of natural resources. The commission reviews and approves land use applications, zoning regulation amendments, planning and development projects, and grant opportunities to ensure that development and growth in the City is consistent with existing land use, environmental policy, and the objectives of its Plan of Conservation and Development. The commission is assisted by the staff of the Planning Department who administers the City's Zoning and Subdivision regulations, administers the Coastal Management Program, performs planning studies, and provides technical assistance to developers.

The Zoning Regulations of the City of Groton were last updated in 2013. The recent updates were performed concurrently with the release of the FIS and DFIRM for New London County in 2013. They include a variety of preventative regulations pertinent to mitigating flooding hazards. These regulations are applied during the permitting process for new construction and during substantial improvement of existing structures.

Section 4.6 addresses coastal area management and potential exemptions from local permitting. The City of Groton enforces a 25-foot setback from any tidal water body or watercourse or from coastal resource areas within the Coastal Area Management Boundary. This excludes the Waterfront Business Residence Zone District and water-dependent uses. In addition, new single-family homes cannot be constructed within 100 feet of tidal wetlands, coastal bluffs and escarpments, or beaches and dunes.

Section 4.6.2 states that all buildings, uses and structures fully or partially within the coastal boundary, as defined by Section 22a-94 of the Connecticut General Statutes, and as adopted and delineated on the Coastal Boundary Map for the City of Groton, shall be subject to the coastal site plan review requirements and procedures in Sections 22a-105 through 22a-109 of the Connecticut General Statutes. Exemptions are listed in Section 4.6.3 and are similar to the town's exemptions.

Section 4.7 of the regulations covers flood protection. The City of Groton utilizes the 1% annual chance floodplain to manage development in floodplains. The 1% annual chance floodplain is depicted on the DFIRM published in 2013 by FEMA and includes areas in Zone A, Zone AE, and Zone VE including floodways. The degree of protection required by this regulation is the minimum reasonable for regulatory purposes.

2.7 United States Navy

The U.S. Navy's base is located in the towns of Groton and Ledyard. Activities on the base are exempt from local zoning regulations, and the Town of Groton does not provide planning services to land on the base. Therefore, land use and coastal management activities on the Groton side of the base are not subject to the coastal site plan review process in Groton.

Under section 307 of the federal Coastal Zone Management Act of 1972, federal activities affecting the coastal zone must be consistent with the enforceable policies of state coastal zone management programs that have received federal approval. Activities subject to the federal consistency requirement include direct federal actions such as development activities on military bases. Therefore, activities on coastal federal military lands such as military bases are theoretically meant to be consistent with federal coastal zone management policies, if not state coastal zone management policies.

According to 32 CFR § 643.33 (policy for coastal zone management), the Coastal Zone Management Act directs all Federal agencies conducting or supporting activities directly affecting the coastal zone of a state to conduct or support those activities in a manner that is consistent with approved state management programs to the maximum extent practicable. However, the opinion of the Attorney General of the United States is that Federal lands are excluded from *mandatory* compliance with the state's coastal zone management program, regardless of the type of Federal jurisdiction exercised thereover.

3.0 PLANNING DOCUMENTS RELATED TO COASTAL MANAGEMENT

This section includes descriptions of planning documents that address coastal issues, enabling more efficient cross-referencing of town-wide planning initiatives and easier amendments to these documents in the future.

3.1 State of Connecticut

Conservation and Development Policies Plan for Connecticut

The previous edition of the *Conservation and Development Policies Plan for Connecticut* was adopted in 2005 and set forth policies through 2009. The Plan identified the following policies as related to coastal areas and coastal resources:

- *Introduction and Overview – Floodways and coastal wave hazards are represented on the Map as Preservation Areas, while the remaining 100-year river and coastal floodplains are shown as Conservation Areas. Given the public's continued attraction to rivers and the coastline, many of the State's flood hazard areas experience intensive commercial and industrial development. The Plan does not prohibit the continuation of the modification of these land uses. The Conservation Area designation is a red flag denoting that future actions must be consistent with the flood management objectives of such an area.*

- *Within Growth Management Principal #3 – Undertake improvements at public use airports in accordance with approved airport master plans. Development or improvements to coastal airports shall be in accordance with coastal area policies.*

- *Within Growth Management Principal #3 – Encourage development of an integrated network of private ferry services and related harbor development, as promoted by the Long Island Sound Waterborne Transportation Plan project, when consistent with municipal and regional plans of conservation and development and coastal area policies. Priority should be given to harbor locations that have the potential to accommodate intermodal connections, reduce highway congestion, and generate complementary landside development.*

- *Within Growth Management Principal #4 – Develop management plans… to provide, protect, and manage recreation and habitat lands, emphasizing: [third bullet] Access to Long Island Sound shoreline areas of highest recreational potential, with recommendations for state-first for purchase, lease-back, easements, and other incentives to maintain and increase public access to coastal areas, or to acquire through emergency-purchase high-hazard coastal areas.*

- *<u>Within Growth Management Principal #4</u> – In order to prevent the loss of life and property in the floodway: [third bullet] Acquire storm-damaged coastal and riverine areas, where appropriate, to increase public access and to prevent rebuilding.*

- *<u>Within Growth Management Principal #4</u> – Promote the objectives of the Long Island Sound Restoration Program: [second bullet] Support State, regional, local, and interstate efforts to protect and restore vital habitats and resources, such as salt marshes, beaches, and coves.*

- *<u>Within Growth Management Principal #4</u> – Promote the objectives of the Long Island Sound Restoration Program: [third bullet] Undertake development activities within coastal areas in an environmentally sensitive manner consistent with statutory goals and policies set forth in the Connecticut Coastal Management Act. Emphasize public access to the waterfront and the priority of water-dependent uses in waterfront development.*

- *<u>Within Growth Management Principal #4</u> – Promote the objectives of the Long Island Sound Restoration Program: [fourth bullet] Consider the projected rise in sea level in the location, design, and protection of development to ensure continued usefulness of potentially impacted properties and utilities and to avoid unnecessary future costs. Where possible, avoid construction of structures such as seawalls that hamper the long-term functioning of vital coastal resources. Identify resource areas likely to be at risk and begin public discussion of options available to lessen or manage the risk.*

- *<u>Within Growth Management Principal #4</u> – Promote the objectives of the Long Island Sound Restoration Program: [fifth bullet] Restrict additional development on offshore islands to preserve their resource and habitat value and to minimize exposure to coastal hazards.*

- *<u>Within Growth Management Principal #5</u> – Restore the water quality of Long Island Sound: [first bullet] Ensure consistency with statutory, coastal area management policies (C.G.S. 22a-92 & 22a-100).*

- *<u>Within Growth Management Principal #5</u> – Restore the water quality of Long Island Sound: [fifth bullet] Plan, design, and implement the State's coastal nonpoint source pollution control program in cooperation with NOAA, NRCS, EPA, soil and water conservation districts, regional, and local interests.*

- *<u>Within Growth Management Principal #5</u> – Restore the water quality of Long Island Sound: [eight bullet] Continue to focus on coastal flood monitoring, early warning system, flood hazard mitigation, and non-structural solutions when addressing coastal flood hazards.*

Groton's subject coastal program includes many of the above policies of the State Plan of Conservation and Development, scaled to the local level.

The current *Conservation and Development Policies Plan for Connecticut* was adopted in 2013 and sets forth policies through 2018. This new plan represents a major change in organization of the *Conservation and Development Policies Plan for Connecticut* as compared to previous editions. The state's current plan identifies the following two policies as related to coastal areas and coastal resources:

- *Within Growth Management Principle #4* (Conserve and Restore the Natural Environment, Cultural and Historical Resources, and Traditional Rural Lands) – Minimize the siting of new infrastructure and development in coastal areas prone to erosion and inundation from sea level rise or storms, encourage the preservation of undeveloped areas into which coastal wetlands can migrate, and undertake any development activities within coastal areas in an environmentally sensitive manner consistent with statutory goals and policies set forth in the Connecticut Coastal Management Act.

- Within *Growth Management Principle #5* (Protect and Ensure the Integrity of Environmental Assets Critical to Public Health and Safety) – Allow redevelopment and rebuilding of coastal areas consistent with coastal area management principles and regulations and prevailing federal rules and requirements.

Groton's subject coastal program is consistent with these two policies.

3.2 Town of Groton

3.2.1 Noank Harbor Management Plan (1992)

The document "Town of Groton, Connecticut Harbor Management Plan – Noank Sector" was prepared in 1992. Noank Harbor is not a specific protected body of water, but instead includes the tidal waters around Noank from Beebe Cove to Palmer Cove, generally between the lower Mystic River and Groton Long Point. Whereas the municipal coastal program focuses mainly on land use in the coastal management area, the harbor management plan focuses on management of the navigable waters offshore from Noank. However, the two plans are closely related because the coastal program addresses public access for activities such as boating, as well as water dependent land uses such as marinas.

The *goals and objectives* of the Harbor Management Plan are organized into the categories "Harbor Administration," "Water Access and Use," "Land Use and Development," and "Natural Resources." The harbor administration goal and objectives address funding, staffing, and the like. The water and land use goal is to establish a

comprehensive water use and access plan that addresses competing demands, while maintaining open access for use and navigation. Objectives include identification and improvement existing public access points and facilities; and several that are related to in-water uses such as mooring management.

The land use and development category has the goal of interfacing with other land use commissions for promoting economic vitality of waterfront-related businesses and options for increased public use. Objectives include:

- Consider adequacy of transportation and signage systems in order to reduce traffic and circulation problems
- Inventory parking, assess the needs to accommodate public access and commercial uses, and recommend a parking management program
- Review, assess, and comment on development opportunities to promote the orderly use of the waterfront
- Identify the needs of, and provisions for, commercial fishing
- Assess future use of Esker Point beach and make recommendations

The natural resources category has the goal of preserving and protecting the significant natural resources and features of the coastal zone within a framework that allows for the orderly and equitable use of waterfront areas. Objectives include:

- Preserve and enhance wildlife habitats, wetlands, marsh lands, and coastal resources
- Encourage measures that would improve the quality of Groton's waters
- Encourage protection and utilization of shellfish and fisheries resources
- Establish a policy for mooring in shellfish areas

Recommendations of the Harbor Management Plan were grouped into five categories that roughly line up with the four categories of goals and objectives. The "harbor administration" recommendations address funding, staffing, and the like. The "water use" recommendations address moorings. Excluding the harbor administration and water use recommendations, the three remaining categories address issues that are directly relevant to this coastal program:

- Public Access – Several areas were recommended for improved access.
  - Esker Point Beach – Creation of new active recreation facilities, community boating facility, and picnic facilities
  - State and Town property at foot of Main Street – Future public amenities or waterfront uses; expand Noank Town Dock facility to provide additional dock space.
  - Morgan Point – Consider adding a small dock where the open space is located.
  - Public Street ends – Utilize the public street ends for visual and physical access.

- Land Use and Development – Several recommendations were made.
  - Signage – The town should provide minimal new signage, but areas that could use signage are the Town dock (for listing rules and directions to other facilities) and several intersections (for assisting those people exiting marinas and boat yards).
  - Parking – Inventory available parking and implement a parking management program to identify limited additional parking.
  - Development Plan Review – Review development plans for consistency with Harbor Management Plan, and inventory available land and assess future public usage.
  - Commercial Fishing – Investigate opportunities to aid the expansion of commercial fishing.

- Natural Resources – Several recommendations were made.
  - Habitats – Work with the Conservation Commission and Shellfish Commission to preserve and enhance habitats of wildlife, wetlands, marshes, and coastal resources areas.
  - Water Quality – Encourage measures to enhance and protect harbor water quality including trash and litter control, adequate marina sanitary facilities and boat pump-outs, etc.
  - Shellfish – Protect and utilize significant shellfish resources, and discourage moorings that may impact them

3.2.2 Groton Plan of Conservation and Development (2002)

Groton's last Plan of Conservation and Development was updated in 2002 with contributions from local Boards and Commissions, private citizens, and citizen groups. Chapter 6 of the plan addresses coastal resources and recommended the following:

Update Coastal Planning

- Undertake a separate planning effort to review and update the 1982 Municipal Coastal Program, as needed.

Protect Coastal Resources

- Continue to carefully manage activities in the coastal boundary in conformance with state law and with consideration of state policies and guidance.
- Continue coastal management programs to maintain and enhance coastal resource areas.

Protect Coastal Water Quality

- Continue efforts to protect and improve coastal water quality.

Improve Coastal Public Access

- Continue successful efforts in obtaining, marking, mapping and aggregating public access.
- Identify and acquire sites and parcels that would contribute to a contiguous greenbelt/riverbelt access system or provide for community benefits.
- Consider acquiring any waterfront site that can provide for community benefits.
- Establish a waterfront land acquisition strategy to ensure that the Town can act swiftly when key coastal properties come to market.

Provide for Water Dependent Uses

- Continue to place highest priority and preference on the use of waterfront sites for water-dependent uses through the coastal site plan review process.

Carefully Manage Coastal Development

- Continue to manage the cumulative impacts of development and redevelopment in coastal areas.
- Continually review regulations affecting coastal areas to ensure that:
  - there are adequate controls for development, individually and cumulatively
  - siting of development within coastal flood hazard areas (A and V zones) is discouraged, and
  - hazards to life and property are minimized
- Encourage or require property owners to build as far back from eroding shorelines and vulnerable beach areas as possible.
- Consider flexible yard requirements to allow for and encourage larger separations of buildings from coastal high hazard areas (like FEMA “V” zones).
- Develop a protocol to address redevelopment of buildings severely damaged or destroyed after a major coastal storm.
- Continue to carefully review all coastal site plans for coastal flood and erosion control structures.
- Discourage or prevent use of flood or erosion control structures except when unavoidable and necessary to protect infrastructure, a water-dependent use, or an inhabited residential structure that pre-dates January 1, 1980.
- Strive to ensure that structural measures will not cause secondary or cumulative shoreline impacts.
- Encourage or require use of "non-structural” erosion control measures (such as vegetated slopes and elevated foundations) when and where appropriate.
- Continue to ensure that all coastal flood and erosion control structures are in compliance with appropriate state and federal requirements.

- Consider purchase of shoreline properties at critical locations after significant hurricane or other storm events.

Other sections of the Plan of Conservation and Development address coastal management and list recommendations that are applicable to this update of the municipal coastal program. Chapter 4, "Protect Natural Resources" includes the following (with underlines added for emphasis):

- Continue to protect and preserve watercourses, inland and tidal wetlands, inland and coastal floodplains, natural diversity database sites, and critical coastal resource areas (such as beaches, dunes, rocky shorefronts, bluffs, and escarpments).
- Establish regulations or policies requiring non-disturbance buffer areas around inland wetlands, coastal wetlands, watercourses, and critical coastal resources.
- Acquire and open up additional public access opportunities to Long Island Sound, the Thames River, and the Mystic River.
- Continue to implement the signage plan to identify coastal access points.

Chapter 8, "Promote Community Character" includes the following (with underlines added for emphasis):

- Continue to protect natural resources, open space, coastal resources, and historical resources in order to enhance their scenic value and overall community character.
- Continue to identify scenic views, scenic vistas, scenic roads, and other scenic resources in Groton.
- Preserve or relocate scenic resources such as stone walls, barns, fences, and other scenic resources that are visible from public streets.
- Amend land use regulations to include protection of scenic views, scenic vistas, scenic roads, and other scenic resources, especially in coastal areas.

A number of other sections of the plan also address coastal management. For example, Chapter 12 (economic development) states that "The [Military Highway was] last studied as part of the 1982 coastal area management program, this area may be ripe for future planning and additional attention should be put into identifying potential future public access."

3.2.3 Groton Long Point Plan of Conservation and Development (2006)

Groton Long Point (GLP) developed a Plan of Conservation and Development in 2006. Chapter 2 of the plan, "Conservation," includes a subsection addressing the protection of natural resources and coastal resources. This subsection explains that most of Groton Long Point falls within the coastal boundary, and that coastal resources include coastal and modified bluffs and escarpments, rocky shorefronts, beaches, estuarine embayments, and intertidal flats that all help provide open space. The plan states that "all responsible

measures should be taken for the preservation of these coastal resources, to include limitation of development on any but especially conservation district association property – plantings, docks, boat outhauls, etc. To perpetuate the existence of natural beaches which provide recreational activities and storm protection for GLP residents, all available techniques will be considered, consistent with the statute and guidelines of the Department of Environmental Protection, to include breakwaters and beach nourishment."

The GLP Plan of Conservation and Development addresses access to the water and consistently emphasizes that water access in GLP is limited to residents and owners. Water access is available at the inner lagoon, outer lagoon, East Dock, South Dock, Kiddie Beach, Main Beach, and South Beach.

True "public access" to the water is not provided in GLP. Although in theory the GLP Association would not be able to restrict access to the areas waterward of the State's line of jurisdiction, which is held in public trust, the Association is able restrict the land that is needed to reach the public trust land below this line. However, because GLP allows access to all of its residents and owners irrespective of where they live *within* GLP, sites such as East Dock, South Dock, and the beaches are somewhat "public" in the sense that all GLP residents and owners can utilize all of these designated access points equally.

3.2.4 Groton Parks and Recreation Master Plan (2009)

A Parks and Recreation Master Plan was developed and adopted in 2009. The Town of Groton provides parks and recreation planning and services to the following geographic areas: Poquonnock Bridge, Center Groton, Mystic, Old Mystic, West Pleasant Valley, Noank, Groton Long Point, City of Groton and the Naval Base. The master plan provided many detailed descriptions that are used elsewhere in this coastal program document. Several strategies offered in the master plan are relevant to coastal management and are listed here (with underlines added for emphasis):

- Strategy 4.3.4 – Maintain and/or enhance the quality of accessible open space by improving or creating trails, signage, support assets (such as benches, trail markers, bridges, on-trail interpretive signage, etc.) in order to enhance the activities within these spaces. Determine the appropriate needed support facilities, including parking areas and restrooms.
- Strategy 4.4.2c – Add an additional water access and/or beach facility to help off-set the heavy use at Esker Point Beach.
- Strategy 4.4.2d – Work with private organizations to expand the boating facilities at Spicer Park.
- Strategy 4.4.2e – Increase the marketing and promotion of Spicer Park for use of park and boating facilities by all members of the public.

- Strategy 4.5.6 – Develop a master plan for Esker Point Beach that will evaluate needed improvements or additional facilities, potentially including the following:
  - 4.5.6a – Remodel or improve the exterior of the concession building.
  - 4.5.6b – Improve parking lot circulation and consider adding landscape islands to assist in clearer delineation of spaces and to accommodate some storm run-off
  - 4.5.6c – A reduction of the amount of paved area of the parking lot should be considered in favor of other uses
  - 4.5.6d – Additional facilities including a playground, picnic shelter, and interpretive signage of the area's geology and estuaries should be considered.
  - 4.5.6e – Improvements to the crossing at GLP Road

3.2.5 Preparing for Climate Change (2011)

The Town of Groton participated in an EPA-funded climate change planning process in 2010 and 2011. The process included the DEEP. The project team of EPA, DEEP, and the Town organized three workshops in 2010 focusing on (1) the climate adaptation planning process and projected global, regional and local climate changes; (2) identification of vulnerabilities from projected changes in global and regional climate; and (3) identification of potential actions that could be used to increase resilience towards existing and projected changes in global and regional climate.

The EPA/DEEP/Town planning process resulted in the report "Preparing for Climate Change in Groton, Connecticut: A Model Process for Communities in the Northeast" (April 2011). During the workshops held in Groton, workshop participants identified the following as climate related impacts likely to affect Groton:

- More frequent river and coastal flooding;
- Increased coastal erosion;
- Increased precipitation, flooding, drought, and erosion;
- More frequent flooding that could prevent access to and reduce function of Groton-New London Airport;
- Access to state parks such as Bluff Point and Haley Farm could be hampered by flooding;
- Docks and marina facilities could be damaged by flooding and sea level rise;
- Increased economic impacts related to infrastructure replacements, loss of employment hours, additional emergency service personnel, and others arising from no action scenarios;
- Sections of Amtrak railroad could flood under certain sea level rise and storm flooding scenarios;
- Mystic River bridge may experience additional openings for smaller boats as bridge clearance diminishes with sea level rise;
- Overall quality of life, aesthetics, and enjoyment of citizens may be reduced.

Specific locations were also identified by workshop participants as vulnerable to climate change impacts such as sea level rise, increased storm frequency, and increased storm intensities:

Transportation	***Residential Locations***
Poquonnock Road	Mumford Cove
Fort Hill Road	Groton Long Point
Groton Long Point Road	Noank
Route 649 Amtrak railroad underpass	Eastern Point
Route 117 at Route 1	Mystic
Route 1 at Fishtown Road	***Commercial Locations***
Route 1 at Poquonnock Bridge	Downtown Mystic
Route 27 at Mystic River Bridge	Poquonnock Bridge
Mystic River Bridge	Airport Industrial Park
Other Town/City Infrastructure	***Ecological Resources***
Reservoir and Water Treatment Plant	Birch Plain Creek – Baker Cove
Wastewater Treatment Plant	Fort Hill Brook – Mumford Cove
Wastewater Pump Stations (30% of pump stations are along the coastline)	Eccleston Brook – Palmer Cove
Claude Chester Elementary School	Groton Long Point Marshes
Cutler Middle School	***Emergency Services***
	Police and Fire Operations
	Emergency Medical Services

Numerous adaptation strategies were developed by workshop participants. Excluding public information and education strategies (which are listed in the report), coastal strategies included:

- Relocate/Elevate vulnerable roads and infrastructure – ensure emergency access and preservation of public safety during extreme events
- Develop Memorandums of Understanding with state personnel regarding funding of local police costs incurred to protect safety along vulnerable state owned road infrastructure during and after storm, so that police can also monitor other hazardous areas
- Flood-proofing of existing buildings
- Conversion of land upriver to wetlands in order to accommodate increased sea level rise
- Creation of incentives for retreat zoning and/or zoning and redevelopment restrictions and building code changes or enforcement to prevent building in the most vulnerable locations
- Purchase of vulnerable land or land that will act as a buffer by Groton
- More stringent building and engineering design standards that anticipate future climate conditions, as opposed to just existing conditions
- Beach nourishment

- Installation of flood/tide gates at locations such as Groton Long Point and Mumford Cove
- Improved road condition reports during extreme events, in order to help the school district and other agencies to identify the safest transportation routes
- Identification of Town, State, and Federal funding available to make the improvements to infrastructure that is deemed highly vulnerable
- Integrate climate preparedness into the Capital Planning process, Master Plan of Conservation and Development update process, the zoning regulations revision, and streetscape project

The Town intended to incorporate some of the findings and recommendations in the Municipal Coastal Program and Plan of Conservation and Development.

3.2.6 Southeastern Connecticut Hazard Mitigation Plan (2012)

The goal of the Southeastern Connecticut Multi-Jurisdictional Hazard Mitigation Plan is to identify vulnerabilities to natural hazards and potential mitigation strategies for such natural hazards in order to reduce the loss of (or damage to) life, property, infrastructure, and natural, cultural, and economic resources. This includes the reduction of public and private damage costs. Limiting losses of and damage to life and property will also reduce the social, emotional, and economic disruption associated with a natural disaster. The initial Southeastern Connecticut Hazard Mitigation Plan was adopted by the municipalities of the SCCOG and approved by FEMA in 2005. The update was developed in 2012 and adopted by the first municipality in October of the same year, resulting in FEMA approval in 2012. The Town of Groton adopted the updated plan in 2012.

The purpose of the Groton annex to the hazard mitigation plan is to provide an update to the natural hazard risk assessment and capability assessment provided in the previous plan, and evaluate potential natural hazard mitigation measures and prioritize natural hazard mitigation projects specific to mitigating the effects of natural hazards to the Town of Groton. The annex is designed to supplement the information presented in the Multi-Jurisdictional plan with more specific detail for the Town of Groton and is not to be considered a standalone document.

The Groton annex addresses an array of natural hazards including inland flooding, wind events such as hurricanes and tornadoes, earthquakes, wildfires, and dam failure. However, coastal hazards and sea level rise are emphasized in the annex, as it was developed only one year after the climate change planning process concluded.

Numerous coastal-related strategies are offered in the hazard mitigation plan annex. Excluding public information and education strategies (which are listed in the hazard mitigation plan and do not need to be repeated here), these include:

- Integrate elements of the hazard mitigation plan and the EPA-funded climate change planning project into the Plan of Conservation and Development and Municipal Coastal Program during the update of those plans.
- Continue to regulate new development activities within SFHAs to the greatest extent possible within the local land use regulations.
- Continually review regulations affecting coastal areas to ensure that siting of development within coastal flood hazard areas (A- and V zones) is discouraged, and hazards to life and property are minimized.
- Limit development activities within potential storm surge areas as mapped by FEMA.
- Consider flexible yard requirements and regulatory incentives to allow for and encourage larger separations of buildings from coastal high hazard areas and encourage or require property owners to build as far back from eroding shorelines and vulnerable beach areas as possible.
- Work with State and Federal agencies to ensure that flood protection regulations reflect current thinking and standards especially with regard to long-term rise in sea levels.
- Utilize the recently released DFIRM to compile a list of addresses with structures within the 1% annual chance floodplain. Track the cost of repairs to these properties following major storm events through outreach or building permits to develop a database of information for potential future grant funding.
- Provide technical assistance to owners of non-residential structures that suffer flood damage regarding floodproofing techniques such as wet and dry floodproofing.
- When property owners become interested, pursue elevations or acquisitions of residential properties that suffer flood damage.
- Upon completion of the update to Groton's Municipal Coastal Program, consider strategic application of freeboard standards of one foot or greater when requiring structure elevations for renovations and new construction in coastal A and V zones.
- Work with the fire districts to pursue floodproofing for the fire stations in flood hazard areas and hurricane surge zones.
- Develop a protocol to address redevelopment of buildings severely damaged or destroyed after a major coastal storm.
- Ensure that the EOP provides up-to-date, detailed instructions regarding the timing of evacuations from the southern part of the Town, since these roads will be significantly flooded or washed out by a major hurricane.
- Conduct beach nourishment and vegetation as needed to keep up with erosion.
- Acquire properties adjacent to tidal wetlands and set aside for advancement of tidal marshes.
- Upgrade stormwater collection and discharge systems to keep up with rising sea level.
- Install appropriately designed flood/tide gates at locations such as Groton Long Point and Mumford Cove, with considerations for sea level rise built into the designed.
- Maintain existing hard structures along the coast in good condition.

- ❑ Strive to ensure that structural measures will not cause secondary or cumulative shoreline impacts.
- ❑ Ensure that the Groton WPCF is adequately protected from coastal flooding and storm surge, and perform improvements if necessary.
- ❑ Complete the ongoing engineering study of Groton Long Point Road Bridge and determine appropriate means of protecting this important mode of egress to keep up with rising sea level and withstand coastal storms.
- ❑ Evaluate potential roadway elevation and structural protections at Groton-New London Airport, as it lies in the coastal flood hazard area.

4.0 COASTAL MANAGEMENT ISSUES

4.1 Overview and Descriptions of Coastal Resources

As a coastal community, the Town of Groton must work to (1) protect and restore its coastal resources, (2) resolve use conflicts on waterfront sites, particularly in favor of promoting water dependent uses, and (3) balance economic growth and resource protection.

Coastal resources vary significantly by type. Likewise, the potential impacts to these resources differ when faced with impacts from development. As defined by Connecticut General Statutes (CGS) Section 22a-93, "Coastal Resources" include the coastal waters of the State, their natural resources, related marine and wildlife habitat and adjacent shorelands, both developed and undeveloped, that together form an integrated terrestrial and estuarine ecosystem. The coastal resources in the State of Connecticut include the following:

- *Coastal Bluffs and Escarpments* are naturally eroding shorelands marked by dynamic escarpments or sea cliffs which have slope angles that constitute an intricate adjustment between erosion, substrate, drainage and degree of plant cover.

- *Rocky Shorefronts* are shorefront composed of bedrock, boulders and cobbles that are highly erosion resistant and are an insignificant source of sediments for other coastal landforms.

- *Beaches and Dunes* are beach systems including barrier beach spits and tombolos, barrier beaches, pocket beaches, land contact beaches and related dunes and sand flats. In general, beaches are dynamic areas abutting coastal waters that are characterized by sand, gravel or cobbles.

- *Intertidal Flats* are very gently sloping or flat areas located between high and low tides composed of muddy, silty and fine sandy sediments and generally devoid of vegetation.

- *Tidal Wetlands* are those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marshes, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some, but not necessarily all, of [a list of specific plant species – see CGS section 22a-29 (2) for a complete list of species]. In general, tidal wetlands form in "low energy" environments protected from direct wave action. They are flooded by tidal waters twice a day and support a diverse ecosystem of vegetation and wildlife.

- *Estuarine Embayments* are a protected coastal body of water with an open connection to the sea in which saline sea water is measurably diluted by fresh water including tidal rivers, bays, lagoons, and coves.

- *Coastal Hazard Areas* are those land areas inundated during coastal storm events or subject to erosion induced by such events, including flood hazard areas as defined and determined by the National Flood Insurance Act, as amended (U.S.C. 42 Section 4101, P.L. 93-234) and all erosion hazard areas as determined by the Commissioner (Connecticut State Commissioner of Environmental Protection). In general, coastal flood hazard areas include all areas designated as within A-zone and V-zones by the Federal Emergency Management Agency.

- *Islands* are lands surrounded on all sides by water.

- *Nearshore Waters* are those waters and their substrates lying between high water and a depth approximated by the ten meter contour.

- *Offshore Waters* means the area comprised of those waters and their substrates lying seaward of a depth approximated by the ten meter contour.

- *Shorelands* means those land areas within the coastal boundary exclusive of coastal hazard areas, which are not subject to dynamic coastal processes and which are comprised of typical upland features such as bedrock hills, till hills and drumlins.

- *Shellfish Concentration Areas* are actual, potential or historic areas in coastal waters in which one or more species of shellfish aggregate.

- *Developed Shorefronts* are those harbor areas which have been highly engineered and developed resulting in the functional impairment or substantial alteration of their natural physiographic features or systems.

The Town of Groton has examples of all the coastal resources that have been identified in the State of Connecticut. This abundance of resources underscores the need for coastal area planning in the town.

4.2 Review of Issues in Previous Municipal Coastal Program

The previous edition of the municipal coastal program described and discussed a large number of individual issues that were generally grouped into three categories: *water, water's edge,* and *land use.* Town-wide efforts of the past 30 years have achieved significant progress in these three areas.

Appendix A includes a table of the recommendations of the previous municipal coastal program. The status of each recommendation is listed in the right-hand column of the table. These recommendations were divided into three programmatic categories: *non-regulatory measures, revisions to the plan of development,* and *revisions to the zoning regulations.* Most of the recommendations have been carried out and either completed, or they are consistently ongoing.

Many changes to the zoning map and zoning regulations were also completed as a result of the initial municipal coastal program. One of the most significant regulatory outcomes of the previous municipal coastal program was the adoption of a Coastal Resource Setback. As noted above in Section 2.3 of this document, Section 6.8 of the Zoning Regulations prohibits new building construction, including minor additions to or modifications of existing buildings or detached accessory buildings, such as garages, utility sheds, pools, tennis courts, or parking lots within 50 feet of any of the following Coastal Resource Areas: coastal waters, tidal wetlands, coastal bluffs, escarpments, beaches or dunes. The section does not apply to the Waterfront Design District or water-dependent uses.

Other notable accomplishments include the construction and opening of the U.S.S. Nautilus tourist attraction, various open space acquisitions, and many points of public access secured. Significant progress has also been made in the redevelopment of Fort Rachel and Mystic, which were important themes of the initial municipal coastal program.

Appendix A lists ten “next steps” that were listed at the conclusion of the initial municipal coastal program. Seven of the next steps have not been directly addressed. While 30 years of coastal management have demonstrated that some of the next steps were not needed (for example, the Noank Village peninsula may not need to be “examined in more detail concerning its future land use”), some of the next steps may remain important considerations for the town of Groton (for example, securing or maintaining a suitable town beach).

4.3 Development of Current Themes

Current coastal issues and concerns were heard and gathered from (1) review of the previous municipal coastal program progress, (2) review of available studies and documentation, and (3) the public outreach conducted for the update of the Plan of Conservation and Development (including public meetings and a public survey hosted by surveymonkey.com). These individual issues were organized into "themes" that reflect the need for a balance between economic development, environmental protection, and public access:

- Sea Level Rise/Coastal Resilience

- Public Access
- Water-Dependent Uses
- Tidal Wetlands
- Water Quality
- Buffers and Setbacks
- Density and Views
- Open Space/Land Acquisitions
- Program Administration

The general relationship between the previous municipal coastal program's issues and the current nine themes is captured in Table 4-1 on the next two pages.

These themes are presented in the next nine sections. Each theme has one or more consequence policy recommendations presented in Section 7.0.

4.4 Sea Level Rise and Coastal Resilience

One notable change from the development of the initial municipal coastal program in 1982 to the development of this edition is a significantly increased attention to coastal hazards in general among members of the public, and specifically an increased attention to climate change and sea level rise. The previous municipal coastal program discussed erosion and shoreline change but made no mention of sea level rise. Although erosion and shoreline change have long been recognized as coastal hazards, it is only recently that the chronic problem of sea level rise has been closely connected to the acute threats of erosion and shoreline change. Indeed, sea level rise may accelerate from current trends and therefore increase the incidence, severity, and adverse effects of erosion and shoreline change.

The town of Groton is very much concerned with coastal hazards and resilience as reflected in the discussions above in Sections 3.2.5 and 3.2.6. Thus, this updated municipal coastal program addresses coastal hazard resilience and its implications on coastal land use.

Table 4-1
Cross-Reference – Topics of the Initial Plan and Update

Issues Listed in Previous MCP	*Categories in the Updated MCP*								
	Sea Level Rise/Coastal Resilience	Public Access	Water-Dependent Uses	Tidal Wetlands	Water Quality	Buffers and Setbacks	Density and Views	Open Space/Land Acquisitions	Program Administration
Water									
Maintenance of Navigation Channels			✓		✓				
Dredging of Coves and Channels	✓		✓		✓				
Shellfishing Areas		✓			✓				
Establish Limited Ferry Service to Mystic Seaport		✓	✓						
Water Quality					✓	✓			
Water-Oriented Commercial Development along Thames	✓	✓	✓		✓	✓			
Water's Edge									
Marina Development	✓	✓	✓		✓		✓		✓
Docks and Piers	✓	✓	✓						✓
Moorings			✓						
Beaches	✓	✓							
Visual Access							✓		✓
Public Access		✓					✓	✓	✓
Erosion	✓			✓		✓			
Waterfront Use Incompatibilities		✓	✓				✓		✓
Land Use									
River Road Zoning/Open Space	✓	✓				✓		✓	✓
Mystic Traffic Congestion									
Walkways and Bikeways along Waterfront		✓	✓				✓		✓
Protection of Land along Tidal Wetlands	✓			✓	✓	✓		✓	✓
Residential Neighborhood Preservation							✓		✓
Open Space Preservation at Bluff Point, Haley Farm, etc.		✓		✓				✓	
Sewer Outfalls in Coves					✓				

Issues Listed in Previous MCP	*Categories in the Updated MCP*								
	Sea Level Rise/Coastal Resilience	Public Access	Water-Dependent Uses	Tidal Wetlands	Water Quality	Buffers and Setbacks	Density and Views	Open Space/Land Acquisitions	Program Administration
Tourist Influx at Nautilus Memorial		✓							
Discharges to Cove from Industrial Park					✓				
Roadway Maintenance					✓				
Open Space /Public Access with New Residential Development		✓		✓		✓	✓	✓	✓
Airport Expansion	✓	✓			✓		✓		✓
Setbacks for Residential Development	✓			✓		✓	✓		✓
Expand Waterfront Design District for Mixed-Use Development	✓	✓	✓		✓	✓	✓		✓

Current FEMA Mapping

FEMA's coastal base flood elevations (the elevation anticipated to occur with a chance of 1% in any given year) in Groton range from __ to __ above sea level, NAVD. Map 4-1 presents the DFIRMs adopted in 2013.

FEMA MAPPING

Coastal flood risk areas in Groton are delineated by FEMA on a Flood Insurance Rate Map (FIRM) and described in a Flood Insurance Study (FIS). The digital FIRM (DFIRM) was initially published on July 18, 2011 with the remainder of New London County to replace the original single-jurisdiction FIRM panels dating back many years. However, new coastal DFIRMs were issued by FEMA in 2013 for Connecticut and they have been subsequently adopted in Groton. The new DFIRMs for Groton have resulted in some changes in coastal base flood elevations, but these changes are not due to the incorporation of sea level rise. Instead, the changes have resulted from improved modeling and analysis of coastal hazards such as storm surges.

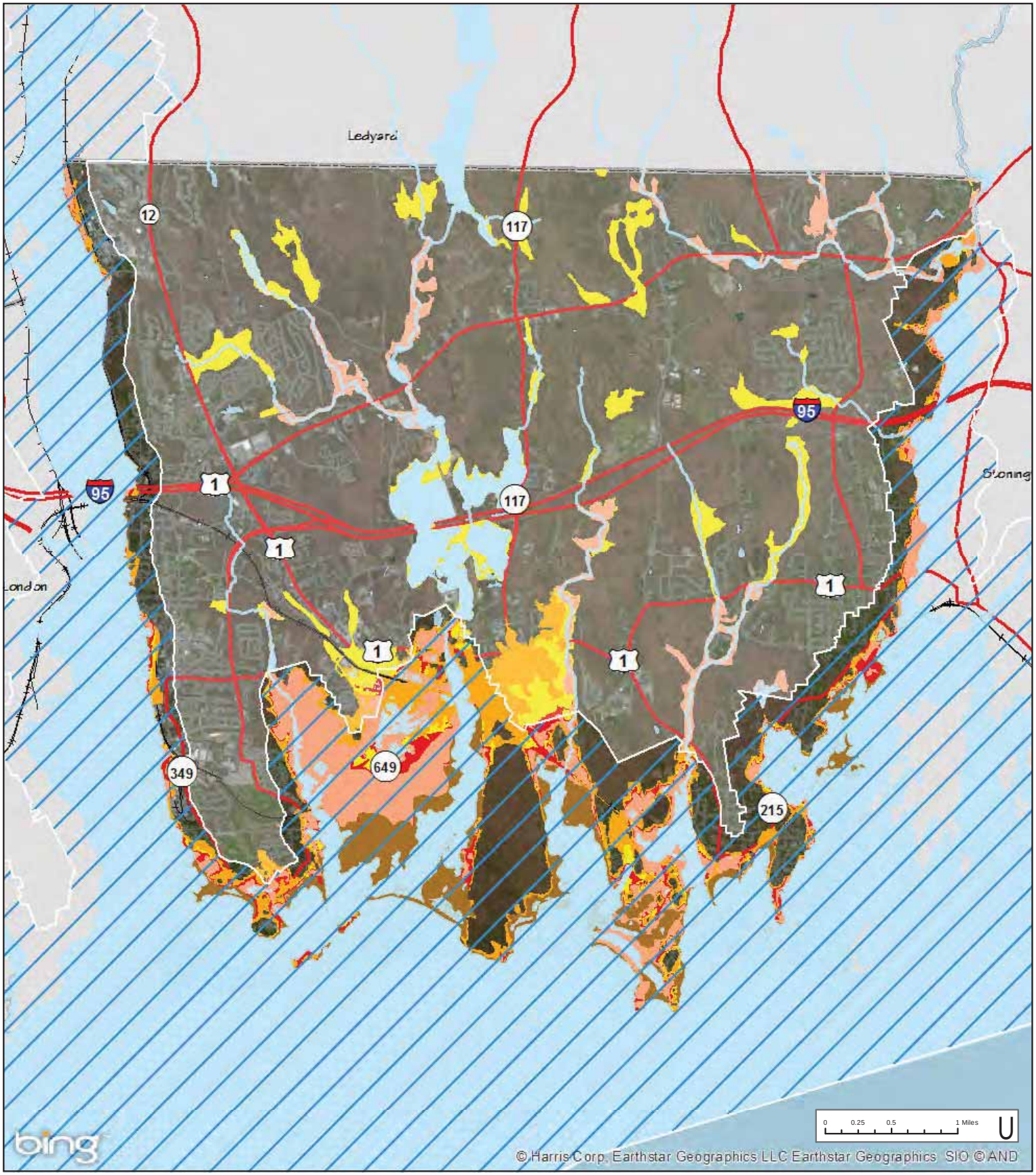
Tropical Storms Irene and Sandy

The Town of Groton sustained coastal flooding and damage to waterfront infrastructure as a result of the storm surge from Tropical Storm Irene in August 2011 and SuperStorm Sandy in October 2012. As of mid-2011, four repetitive loss properties were reported in Groton, and none were believed related to coastal flood zones. As of mid-2013, a total of nine repetitive loss properties were reported in Groton (not including the city. Five of the nine are located in Groton Long Point, indicating increased reporting of insured coastal flood damage from Irene, Sandy, and other coastal events that may have occurred.

Map 4-2 presents Hurricane Surge mapping for Groton. Maps 4-3, 4-4, and 4-5 illustrate the inundation caused by SuperStorm Sandy in three areas of Groton – the airport area, Esker Point Beach, and Mystic. These inundation areas were delineated by the USGS and are based on LiDAR topographic mapping and USGS-approved high water marks recorded after the storm. The inundation areas are consistent with other observations, as well. For example, a runway safety feature was damaged at the airport, and the damaged feature is located where inundation was depicted by USGS.

Sea Level Rise Projections and Calculators

Sea levels have risen and are currently rising along the Atlantic coast. The Intergovernmental Panel on Climate Change (IPCC) concludes based on available data that there has been a global mean rise in sea level between 10 and 25 centimeters (cm) (approximately four to 10 inches) over the last 100 years (Neumann et al., 2000). Relative sea level rise at Boston and Woods Hole gauges over the same time period is estimated at 26 cm (10 inches) according to the United State Geological Survey.



Groton, Connecticut

Plan of Conservation and Development

Coastal Flood Zones

Legend

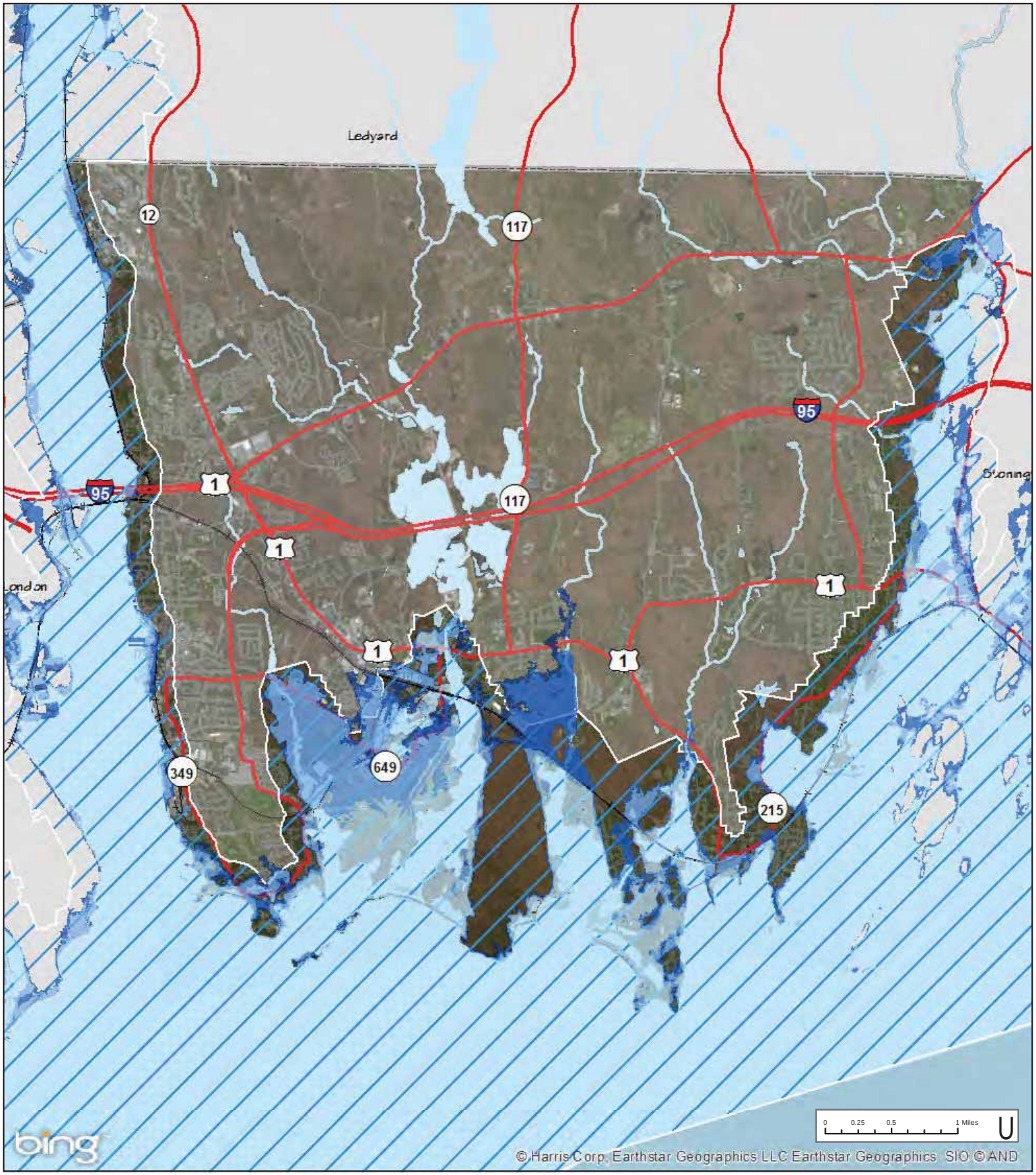
- Coastal Management Area Boundaries
- 100-Year Flood Zone
- Change since 2010 (+228 acres)
- 500-Year Flood Zone
- Change since 2010 (+804 acres)
- Coastal Flood Zone

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

Milone & MacBroom



Groton, Connecticut

Plan of Conservation and Development

Hurricane Inundation Areas

Legend

- Category 1 Hurricanes
- Category 2 Hurricanes
- Category 3 Hurricanes
- Category 4 Hurricanes
- Coastal Management Area Boundaries

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

Milone & MacBroom

SOURCE(S):

DFRIM FEMA, 2013
LiDAR, 2000
CT Ortho, 2010
USGS Hurricane Sandy Storm Tide, 2013

Figure 2-2: Groton - New London Airport Hurricane Sandy Storm Tide Area

LOCATION:

Groton, CT

3

Town of Groton Plan of Conservation & Development & Municipal Coastal Program

MXD: P:\1461-08\Design\GIS\Maps\Fig2-2_AirportareaSandy.mxd

Map By: JDW
MMI#: 1461-08
Original: 07/30/2013
Revision: 8/20/2013
Scale: 1 inch = 1,000 feet

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SOURCE(S):
DFRIM FEMA, 2013
LiDAR, 2000
CT Ortho, 2010
USGS Sandy Mapper, 2013

Figure 2-3: Esker Point Hurricane Sandy Storm TIde Area

LOCATION:
Groton, CT

3

Town of Groton Plan of Conservation & Development & Municipal Coastal Program

MXD: P:\1461-08\Design\GIS\Maps\Fig2-3_EskerPoint.mxd

Map By: JDW
MMI#: 1461-08
Original: 07/30/2013
Revision: 8/20/2013
Scale: 1 inch = 250 feet

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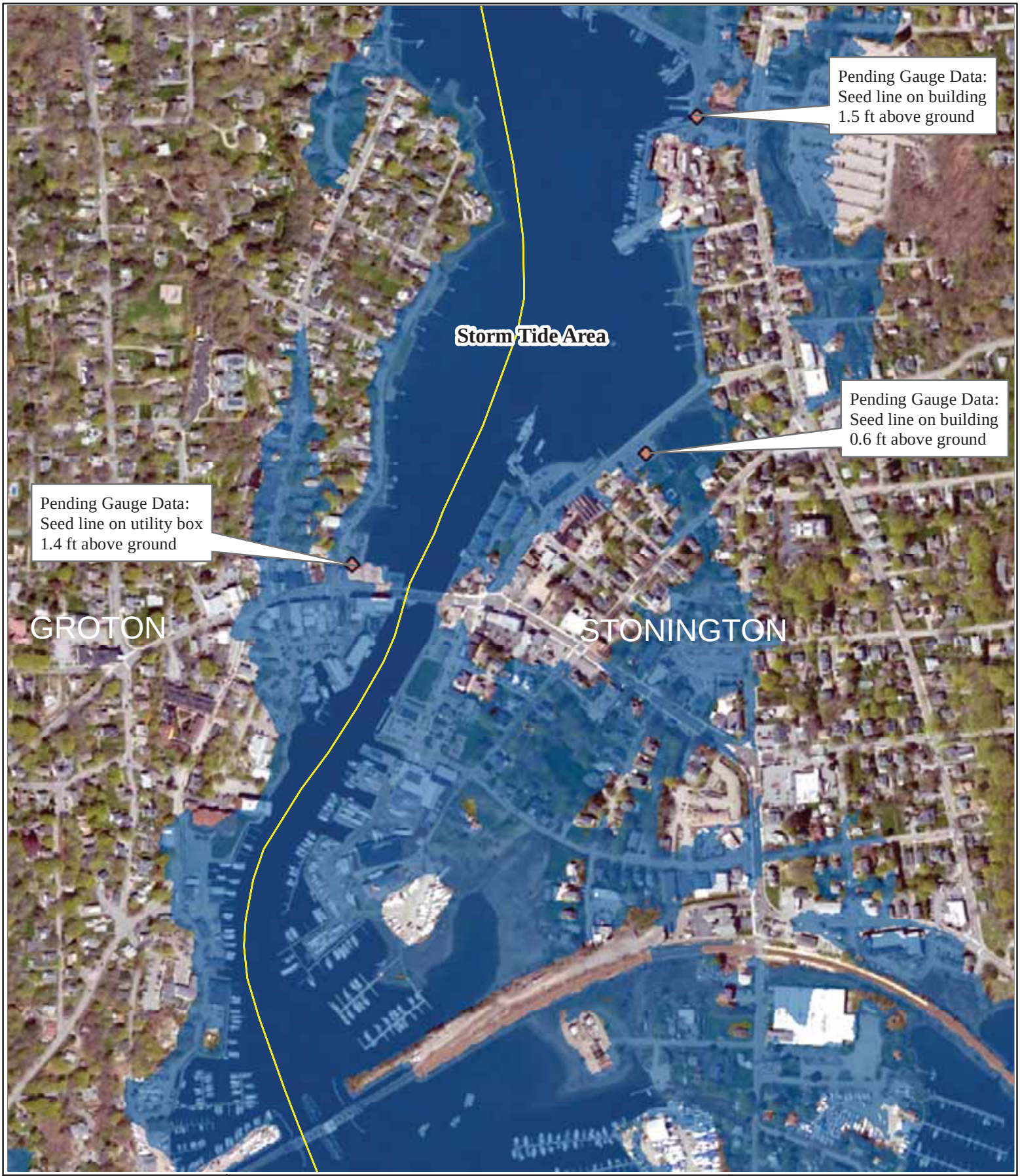

SOURCE(S):
DFRIM FEMA, 2013
LiDAR, 2000
CT Ortho, 2010
USGS Sandy Mapper, 2013

Figure 2-1: Mystic Hurricane Sandy Storm Tide Area

LOCATION:
Groton, CT

3

Town of Groton Plan of Conservation & Development & Municipal Coastal Program

MXD: P:\1461-08\Design\GIS\Maps\Fig2-1_MysticSandy.mxd

Map By: JDW
MMI#: 1461-08
Original: 07/30/2013
Revision: 8/20/2013
Scale: 1 inch = 500 feet

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In its landmark 2001 report, the IPCC projected that global sea level may rise nine to 88 centimeters during the 21st century. According to the February 2007 update report by the IPCC, these predictions have been somewhat refined using six global climate models to project a more narrow range of sea level rise of 28 to 43 cm (11 to 16.9 inches) in the 21st century.

Although erosion and shoreline change have long been recognized as coastal hazards nationwide, it is only recently that sea level rise has been viewed as a hazard to be considered while planning for resilience. Indeed, continued increases in the rate of sea level rise will increase the incidence, severity, and adverse effects of flooding, erosion, and shoreline change. Consider the following:

- A continued increase in the rate of rising sea levels will inundate low areas, increase erosion of beaches and tidal marshes, increase the incidence of flooding from storm surges, and enable saltwater to advance upstream and intrude further into estuaries and aquifers.
- Future sea level rise could result in the disappearance of a large percentage of Groton's tidal wetlands unless they can advance as quickly as the rising level.
- Saltwater advancing upstream along estuaries can alter the point at which sedimentation leads to the creation of shoals and other features.
- FEMA's coastal base flood elevations will progressively rise along with sea level. This means that the 100-year and 500-year flood levels will affect lands and structures that are currently at unaffected elevations.
- As sea level rises, storm surges from hurricanes and nor'easters will reach further inland as they are starting from a higher base level.
- As sea level rises, drainage systems become less effective. Rainstorms will have the potential to cause greater flooding.

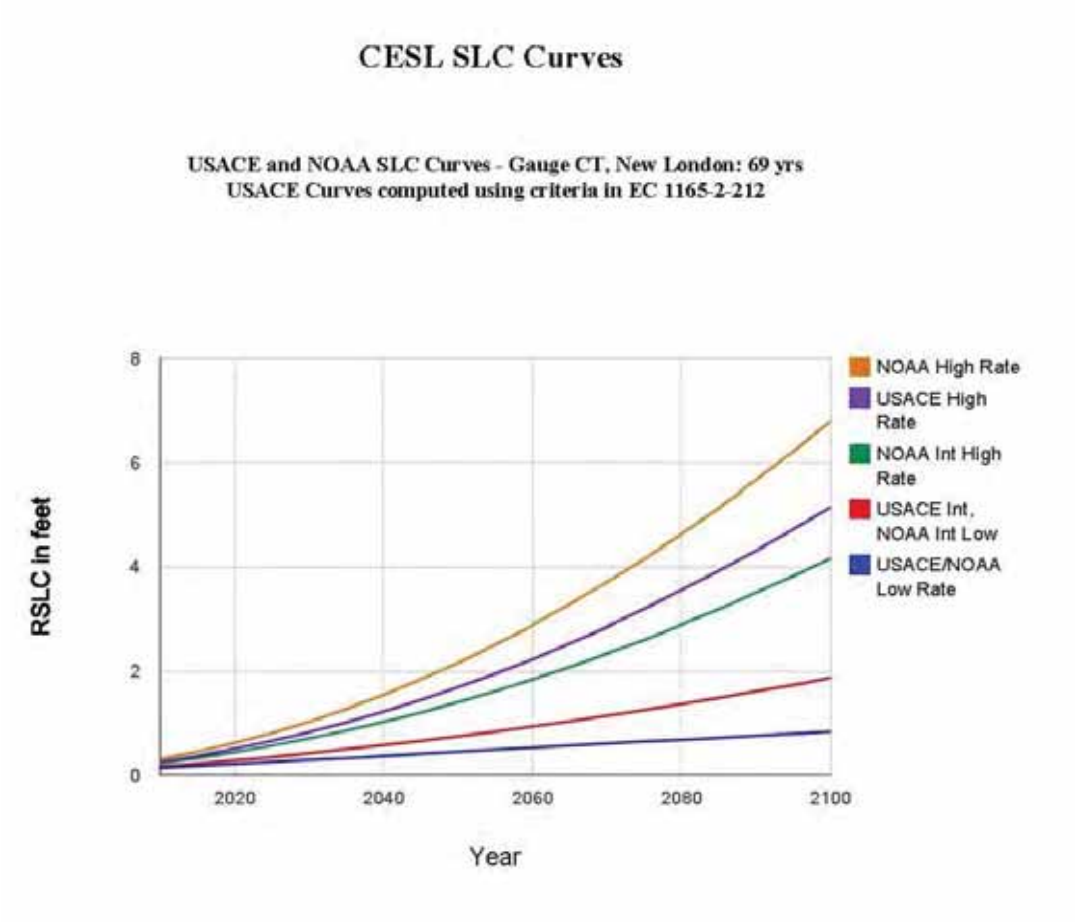
It has long been expected that the rate of sea level rise in Connecticut will be slightly higher than the global projections due to the effects of regional subsidence. However, more recent studies have asserted that changes in ocean circulation will increase the relative sea level rise along the Atlantic coast even more.

NOAA Technical Report OAR CPO-1 entitled *Global Sea Level Rise Scenarios for the United States National Climate Assessment* (December 2012) was prepared in partnership with USGS and the U.S. Army Corps of Engineers. This report is the current reference for sea level rise planning in the United States. The report states that "We have very high confidence that global mean sea level will rise at least 0.2 meters (8 inches) and no more than 2 meters (6.6 feet) by 2100."

The U.S. Army Corps of Engineers hosts a sea level projection web tool ("Sea-Level Change Curve Calculator") at http://www.corpsclimate.us/ccaceslcurves.cfm. The calculator will provide sea level rise projections using U.S. Army Corps of Engineers and

NOAA projections at existing tidal gauges. The nearest gauge to Groton is the tide gauge in New London. Calculated sea level rise for this gauge is depicted in the following table and graph. In each case, the base year is 1992. Rates are "NOAA Low, NOAA Intermediate Low, NOAA Intermediate High, USACE Low, USACE Intermediate, and USACE High" as follows:

- USACE Low Curve uses the historic rate of sea-level change as the rate forward.
- The rate for the USACE Intermediate Curve is computed from the modified NRC Curve I considering both the most recent IPCC projections and modified NRC projections with the local rate of vertical land movement added.
- The rate for the USACE High Curve is computed from the modified NRC Curve III considering both the most recent IPCC projections and modified NRC projections with the local rate of vertical land movement added.



USACE Curves computed using criteria in USACE EC 1165-2-212

NOAA Curves computed using criteria in NOAA SLR Report 06-Dec-2012

Gauge CT, New London: 69 yrs All values are in feet							
Year	NOAA Low	USACE Low	NOAA Int Low	USACE Int	NOAA Int High	USACE High	NOAA High
2010	0.14	0.14	0.17	0.17	0.23	0.26	0.31
2015	0.18	0.18	0.23	0.23	0.33	0.37	0.45
2020	0.22	0.22	0.29	0.29	0.44	0.51	0.62
2025	0.26	0.26	0.35	0.35	0.57	0.66	0.81
2030	0.30	0.30	0.42	0.42	0.71	0.83	1.03
2035	0.33	0.33	0.50	0.50	0.86	1.02	1.28
2040	0.37	0.37	0.58	0.58	1.03	1.23	1.55
2045	0.41	0.41	0.66	0.66	1.21	1.45	1.85
2050	0.45	0.45	0.75	0.75	1.41	1.70	2.17
2055	0.49	0.49	0.84	0.84	1.62	1.96	2.52
2060	0.53	0.53	0.94	0.94	1.85	2.24	2.89
2065	0.57	0.57	1.04	1.04	2.09	2.54	3.29
2070	0.61	0.61	1.15	1.15	2.35	2.86	3.71
2075	0.65	0.65	1.26	1.26	2.61	3.20	4.16
2080	0.68	0.68	1.37	1.37	2.90	3.56	4.64
2085	0.72	0.72	1.49	1.49	3.19	3.93	5.14
2090	0.76	0.76	1.62	1.62	3.51	4.32	5.67
2095	0.80	0.80	1.74	1.74	3.83	4.73	6.22
2100	0.84	0.84	1.88	1.88	4.17	5.16	6.80

The ranges calculated in the above graph and table are quite wide, but even the low projections show that sea level rise will continue throughout the century. The USGS has demonstrated that sea levels along the mi-Atlantic and northeast coasts of the United States are already rising three to four times faster than the global average since 1990. This heightens the need for resilience planning in Groton.

Sea Level Rise Viewer Tools

Several sea level rise viewer tools are available for assessing future sea levels in the Groton area including the Connecticut Coastal Hazards Viewer at http://ctecoapp1.uconn.edu/ctcoastalhazards/ and NOAA's popular tool at http://csc.noaa.gov/digitalcoast/tools/slrviewer. One of the benefits of the various viewer tools is that they can be used for decision support and local or regional planning, in addition to public education and outreach.

The "Coastal Resilience" program for New York and Connecticut is a collaborative effort led by The Nature Conservancy (TNC) in partnership with NOAA's Coastal Services Center, Association of State Floodplain Managers (ASFPM), Columbia University Earth Institute/NASA Goddard Institute for Space Studies, Pace University's Land Use Law Center, University of Southern Mississippi, and the University of California at Santa Barbara. The Coastal Resilience decision support tool is the sea level rise viewer produced by this collaboration. The tool is an interactive decision support instrument that explores future flooding scenarios caused by sea level rise with or without storm surges. The visual information is intended to inform development and conservation decisions.

The ability to combine storm and non-storm scenarios with future sea level rise projections is one of the benefits of the Coastal Resilience decision support tool. The coastal resilience tool can map potential flood scenarios for the decades of the 2020s, 2050s, and 2080s under three sets of conditions: no storm (in other words, only the impacts of sea level rise), Category 2 hurricane, and Category 3 hurricane. These three sets of conditions are further paired with three sets of relative or "downscaled" sea level rise projections: "high," "medium," and "conservative" which derived from modeling of three different emissions scenarios and seven global climate change models coupled with historic tide gauge data, subsidence rates, and several other variables (Columbia/NASA). The result is a set of 27 different possible views as listed below in Table 4-2.

Table 4-2
Future Flood Scenarios Mapped by the Coastal Resilience Tool

Decade	Condition	Sea Level Rise Estimates*	Elevation (ft, NAVD)
2020s	No Storm	High	3.7
		Medium	3.3
		Conservative	3.3
	Category 2	High	9.8
		Medium	9.4
		Conservative	9.4
	Category 3	High	12.8
		Medium	12.4
		Conservative	12.4
2050s	No Storm	High	5.2
		Medium	3.8
		Conservative	3.9
	Category 2	High	11.3
		Medium	9.9
		Conservative	10.0
	Category 3	High	14.3
		Medium	12.9
		Conservative	13.0
2080s	No Storm	High	7.3
		Medium	4.7
		Conservative	4.5
	Category 2	High	13.4
		Medium	10.8
		Conservative	10.6
	Category 3	High	16.4
		Medium	13.8
		Conservative	13.6

*High = emissions scenario A2 + 3.28 feet (1 meter)
Medium = emissions scenario A2
Conservative = emissions scenario A1B

Table 4-3 provides the relative or downscaled sea level rise projections for Long Island Sound that were generated under a contract between TNC and Columbia University's Earth Institute/NASA Goddard Institute for Space Studies in 2010-2011. These projections are geospatially projected within the Coastal Resilience decision support tool.

Table 4-3
Downscaled Sea Level Rise Projections for Long Island Sound
Across Several Emission Scenarios

Scenarios	2020	2050	2080
Conservative	3.5 inches	10 inches	18.5 inches
Medium	3.5 inches	10 inches	20 inches
High	9 inches	26 inches	52 inches

The Coastal Resilience decision support tool was used to evaluate different parts of Groton in the 2020s, 2050s, and 2080s. In general, the "medium" projections were utilized for making planning-level decisions, whereas the "conservative" and "high" projections were used for comparison purposes. Three specific areas – the airport, Mystic, and Esker Point – were evaluated with further detail. These geographic discussions have been incorporated into Chapter 5 of this municipal coastal program document. Coastal risk and adaptation concepts are outlined below.

Coastal Risk and Resilience Concepts

In the context of hazards, risk is commonly defined as the product or the sum of vulnerability and frequency. Thus, if an event has (1) a low frequency and (2) very few people, structures, and infrastructure are vulnerable to the effects of that event, then the risk is low. If an event has a high frequency and many people, structures, or components of infrastructure are vulnerable to the effects of that event, then the risk is high. Either low frequency coupled with high vulnerability or high frequency coupled with low vulnerability will produce moderate risk.

In the context of coastal hazards, risk will change over time because the frequency will increase. Coastal storms are believed to be increasing in frequency, and flooding will increase in frequency as sea level rises. Thus, even if coastal vulnerabilities in Groton remain static, risks will increase.

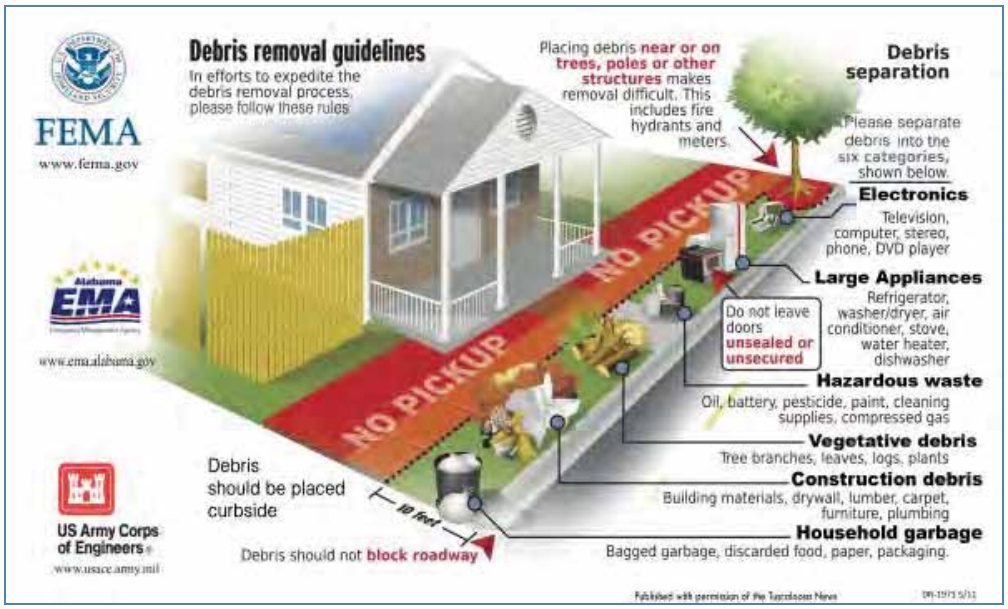
Therefore, Groton is at a crossroads with regard to reducing risk. Vulnerabilities can remain static and risk can increase, or vulnerabilities can be reduced to hold risk at bay. If vulnerabilities can be reduced even further, than risks could be lowered in the face of rising sea level and increased coastal storms, leading to increased resilience. The least desired combination of all would be the development of increased vulnerabilities while frequencies increase, because risks could rise faster than expected. An example of increased vulnerability would be conversion of commercial space in Mystic to condominiums located in the coastal flood risk zone.

According to the United States Department of Homeland Security, resiliency is "the ability of any system (infrastructure, government, business, and citizenry) to resist,

absorb and recover from or successfully adapt to an adversity." Coastal resilience is therefore the ability to resist, absorb, recover from, or adapt to coastal hazards such as sea level rise, increased flooding, and more frequent and intense storm surges. "Adaptation" is the typical term for adjusting to climate change and sea level rise.

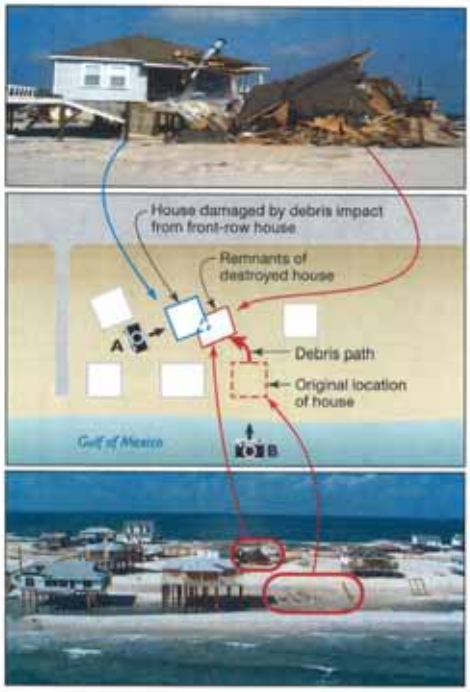
Residential and non-residential properties are directly vulnerable to coastal hazards with regard to flooding and wave action. Waves can destroy a structure. Floodwaters cause massive damage to the lower levels of homes and businesses, destroying heating and other equipment, furniture, important papers, and possessions. Wet and damp conditions trigger the growth of mold and mildew in flooded buildings. Gasoline, pesticides, sewage, and other aqueous pollutants can be carried into areas and buildings by floodwaters and soak into soil, building components, and furniture.

The costs to clean up a home after flooding can range from less than $10,000 to more than $100,000 depending on the damage. The amount of debris produced by flooding can be staggering. The graphic below (courtesy of FEMA) demonstrates the types of debris that can be generated, all requiring disposal and replacement.



The land surrounding homes is also vulnerable to coastal hazards. Vehicles, pools, landscaping, and outbuildings can be washed away or destroyed. Erosion can alter the ground surface. Wells and septic systems can be damaged or rendered useless.

The graphic to the right (courtesy of FEMA) illustrates another type of vulnerability. Debris from a damaged building can be moved by floodwaters or a storm surge and damage a nearby building.



The indirect vulnerabilities to properties can be as bad as the direct vulnerabilities. Floodwaters can prevent emergency egress by blocking streets, deteriorating municipal drainage systems, and diverting municipal staff and resources. This can leave a home vulnerable to fire or other damage, leading to further economic losses. In some situations, a home may be situated above current and future flood elevations, but access to the home may be increasingly cut off by flood waters associated with storms or even from normal high tides.

Adaptation Options

Many coastal resilience and adaptation strategies, measures, and actions have been described in the climate change literature since the late 1980s. The IPCC published the landmark paper "Strategies for Adaptation to Sea Level Rise" in 1990. The preface states that "this report represents the first survey on a global scale of adaptive options for coastal areas in response to a possible acceleration of sea level rise and the implications of these options." This was one of the earliest reports to list the three traditional categories of adaptation "to protect human life and property." The following descriptions of these three types of adaptation are taken from the report:

- Retreat involves no effort to protect the land from the sea. The coastal zone is abandoned and ecosystems shift landward. This choice can be motivated by excessive economic or environmental impacts of protection. In the extreme case, an entire area may be abandoned.

- Accommodation implies that people continue to use the land at risk but do not attempt to prevent the land from being flooded. This option includes erecting emergency flood shelters, elevating buildings on piles, converting agriculture to fish farming, or growing flood or salt tolerant crops.

- Protection involves hard structures such as sea walls and dikes, as well as soft solutions such as dunes and vegetation, to protect the land from the sea so that existing land uses can continue.

In 2010, NOAA's Office of Ocean and Coastal Resource Management published the manual "Adapting to Climate Change: A Planning Guide for State Coastal Managers." Chapter 5 is dedicated to a discussion of adaptation strategies and methods. According to the manual, NOAA recognizes seven categories of "Climate Change Adaptation Measures" ranging from assessment and awareness to loss reduction and growth management.

The EPA publication "Rolling Easements" (Titus, 2011) provides the most current comprehensive description of rolling easements and all the adaptation measures found in this broad collection of techniques. Rolling easements are not actual easements, but are instead regulatory and policy methods to allow short-term land uses to occur. As noted by Titus in this publication, *accommodation* is viable in many communities, but no longer considered sustainable for the long term; eventually *protection* or *retreat* will be the default. This is an important concept because communities will need to understand that there is a limit to how far into the future accommodation will be practical. Rolling easements can be thought of as a combination of the circa-1990 principles of accommodation and retreat.

> "A rolling easement is a legally enforceable expectation that the shore or human access along the shore can migrate inland instead of being squeezed between an advancing sea and a fixed property line or physical structure. The term refers to a broad collection of legal options, many of which do not involve easements. Usually, a rolling easement would be either (a) a law that prohibits shore protection or (b) a property right to ensure that wetlands, beaches, barrier islands, or access along the shore moves inland with the natural retreat of the shore." (Titus, 2011)

Freeboard

Freeboard standards require structures to be elevated higher than the level that FEMA requires through the NFIP regulations. Application of freeboard standards to coastal flood zone elevations is typically viewed as more effective than applying freeboard standards to inland flood zones. When used alone, freeboard standards provide additional certainty that flood levels will not damage a structure. When use in combination with V-zone standards described below, freeboard standards can provide an additional level of flood damage prevention. Independent academic studies have found that freeboard is one of the most effective tools to reduce flood damages. A study of the CRS found that insured flood losses were reduced by almost $ 1 million in communities that require freeboard. And finally, freeboard is an effective means of addressing sea level rise and

future flood levels without necessitating that future flood levels be definitively established for a community. The figure below (courtesy of FEMA) depicts freeboard.

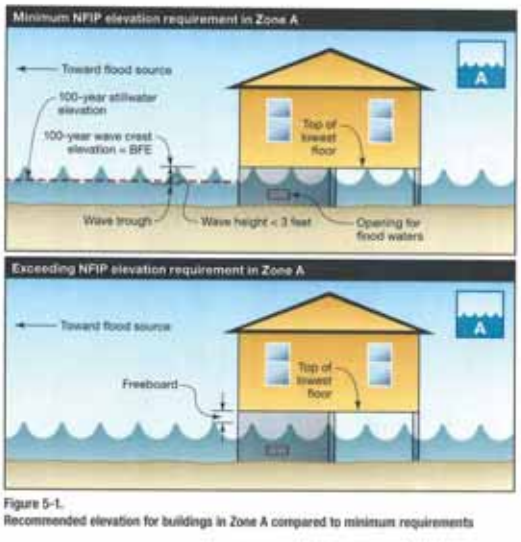


Figure 5-1.
Recommended elevation for buildings in Zone A compared to minimum requirements

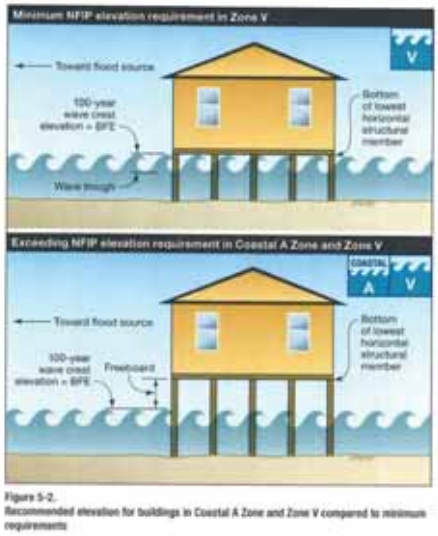


Figure 5-2.
Recommended elevation for buildings in Coastal A Zone and Zone V compared to minimum requirements

Freeboard standards can be found statewide in New York (where two feet of freeboard is required for new construction and substantial improvements) and a few other states, but it is not required by the State of Connecticut unless hazard mitigation grant funds are used for elevating structures. Municipalities in Connecticut are entitled to adopt freeboard standards. Because Connecticut municipalities utilize the State's adopted building codes, freeboard is required per local regulations rather than the building code. Many communities in Connecticut require freeboard. Examples include:

- Ansonia – 1 foot
- Norwich – 1.5 feet
- Waterford – 1 foot
- Meriden – 1 foot
- Old Saybrook – 1 foot
- Newtown – 4 feet

At four feet, the Town of Newtown may have the most aggressive freeboard requirement in Connecticut.

Applying V Zone Standards in Coastal A Zones

Old Saybrook is a local example of a community that requires the use of V zone standards in coastal A zones. The effect is to cause a greater level of protection to new construction and substantial improvements in coastal A zones as compared to the same structures in coastal A zones prior to the amendment. The application of more stringent

codes not only protects a given structure; it also protects *nearby* structures from damage caused by collapsing or floating structures and debris.

The Town of Old Saybrook adopted changes to its Zoning Regulations in 2012 that were moderate in terms of text involved yet very progressive for a Connecticut community. These amendments require one foot of freeboard and the application of V zone standards in coastal A zones. The revised Old Saybrook Floodplain Management Ordinance now states the following (with underlines for emphasis):

- Section 2.9: "VE Zone floodplain construction standards are applied to development, new construction and substantial improvements in the Coastal AE Zone."
- Section 2.26: "The floodplain development and construction standards for VE Zones will be applied in the Coastal AE Zone."
- Section 5.3.1: "New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated at least one foot above the base flood elevation."
- Section 5.3.2.1: New construction or substantial improvement of any commercial, industrial, or non-residential structure located in Zone A or AE, shall have the lowest floor, including basement, elevated at least one foot above the base flood elevation; or
- Section 5.3.2.2: Non-residential structures located in all A and AE zones may be dry flood-proofed at least one foot above the base flood elevation in lieu of being elevated provided that together with all attendant utilities and sanitary facilities the areas of the structure below the required elevation are water tight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.
- Section 5.3.4.2: All buildings or structures [in coastal high hazard areas] shall be elevated so that the lowest supporting horizontal member is located no lower than one foot above the base flood elevation and with all space below the lowest supporting horizontal member open so as not to impede the flow of water, except for breakaway walls as defined in Section 2.7.
- Section 5.3.7.1: New construction of critical facilities shall be elevated or dry flood proofed to one foot above the base flood elevation (100-year flood elevation).

Acquisition of Property Damaged by Coastal Hazards

Immediately following coastal hazard events such as severe storms and damaging storm surge, Groton may occasionally have opportunities to acquire damaged structures and their underlying properties rather than the owner electing to make costly repairs to continue living at risk. Even if properties are repaired, Groton may have opportunities to acquire structures that have suffered repeated damages. Subject to a successful demonstration of a benefit-cost ratio above 1.0, FEMA mitigation funds may be available for acquiring damaged properties using one of the grant programs (Pre Disaster

Mitigation, Hazard Mitigation Grant Program, and Flood Mitigation Assistance)[1]. In lieu of completing the benefit-cost analysis, FEMA's new automatic cost effectiveness may be applied to acquisition projects (projects cost must be less than $276,000 for a property in a SFHA).

Zoning Overlay Districts

Groton may wish to adopt a zoning overlay district that is delineated using a line of future daily inundation or a future storm of a given hurricane category/intensity. Once adopted, the town could enact any number of requirements for development or redevelopment within the overlay, including freeboard and application of V zone standards in coastal A zones as described above (if not already incorporated into Zoning Regulations) or more stringent freeboard such as two feet. Other possibilities may include variable setbacks and buffers or restrictions on what types of renovations or expansions may be permitted for existing buildings.

In general many of the strategies discussed in this plan could be linked to overlay zones as a means of furthering coastal resilience for particular properties located in an overlay zone that may be seeking various development or redevelopment permits. The following are strategies, tools, and requirements that can be tied to overlay zones:

- Automatic referrals to other agencies and commissions for advisory reports
- Automatic referrals to other agencies and commissions for consideration of potential offers for acquisition[2]
- Automatic referral to building department for review and report of prior storm and flood damage
- Automatic referral to other agencies and commissions for calculation of benefit-cost ratio to advise whether FEMA mitigation funds could be used for acquisition
- Allow and encourage commercial water dependent uses in residential zones in order to compensate property owners for loss of value
- Relaxed transfer of development rights
- Relaxed approvals for clustered development, planned residential development, or open space subdivision procedures
- Provisions for property tax relief for property owners that set aside suitable marsh advancement areas
- Incentives for residential building design challenges
- Freeboard (as opposed to *no freeboard* elsewhere in town)
- Freeboard (*higher level of freeboard* than the rest of the town)
- Application of V zone standards in coastal A zones

[1] These programs are described in the Hazard Mitigation Plan
[2] Ideally, the town will target specific properties for acquisition prior to these properties coming forward for development or redevelopment approvals and permits.

- Required identification of reserve areas for new septic systems, mounded systems, holding tanks, and/or possible shared systems
- Requirements for maintaining hard shoreline structures (if any are located on the property)

It may be difficult for the town to prohibit certain land uses in overlay zones if the underlying zoning district already allows the land use. Therefore, the overlay zone concept should be used as a method for controlling *how* development could occur that is consistent with the land use allowed by underlying zoning, yet helps achieve overarching coastal resilience goals.

Zoning Amendments

Zoning amendments may be used at any time to require freeboard and application of V zone standards in coastal A zones. The attractiveness of these measures is that they would immediately apply to SHFAs delineated by FEMA, whether or not the town was to implement overlay zones.

Coastal Realignment Strategies

Coastal realignment will ensure that wetlands and beaches migrate inland as buildings and roads are moved or removed. This is the central concept in the broad set of tools known as rolling easements, described above as a combination of retreat and accommodation. Because it is unrealistic to prevent development of low-lying coastal lands that could eventually be submerged by a rising sea, an alternative is to allow development with the recognition that land will be abandoned when the sea rises enough to submerge it. From now until the land is threatened, valuable coastal land can be put to its highest use; once the land is threatened, it will convert to wetland or beach as if it had never been developed.

> If some lands must give way to the rising sea, the economic, environmental, and human consequences could be much less if the abandonment occurs according to a plan rather than unexpectedly. (Titus, 2011)

According to Titus (2011), there are more than a dozen approaches for ensuring that wetlands and beaches migrate inland as buildings and roads are moved or removed. Regulatory rolling easements include:

- Local zoning that restricts shore protection;
- Regulations that prohibit shore protection by state coastal or wetland programs, or require removal of structures standing on the beach or in the wetlands;
- Permit conditions that require public access along the dry beach in return for a building permit; and
- Permit conditions that require public access along the inland side of a new shore protection structure, in return for a permit to build such a structure.

A "property rights approach" includes:

- Affirmative easements that provide the public with the right to walk along the dry beach even if the beach migrates inland;
- Conservation easements that prevent landowners from erecting shore protection structures or elevating the grades of their land;
- Restrictive covenants in which owners are mutually bound to avoid shore protection and allow access along the shore to migrate inland;
- Future interests that transfer ownership of land whenever the sea rises to a particular level;
- Migrating property lines that move as the shore erodes, enabling waterfront parcels to migrate inland so that inherently waterfront activities can continue.
- Legislative or judicial revisions and clarifications regarding the inland migration of public access along the shore and the rights of landowners to hold back the sea; and
- Transferable development rights that provide those who yield land to the rising sea the right to build on land nearby.

The particular details associated with implementing the above rolling easements are too varied to fully describe in a municipal coastal program. As planning continues, Groton will need to determine whether rolling easements are the best methods of encouraging coastal realignment.

Hard shoreline protection

According to Titus (2011), planners in the United States view shore protection as likely for 60% of the low-lying shoreline along the Atlantic coast if sea level rises three feet in the next century. Hard shoreline protection generally includes the following structures that are parallel to the shoreline:

- Seawalls are engineered barriers that protect land from waves and flooding
- Levees are engineered berms that protect land from flooding
- Bulkheads are engineered structures that retain soil and reduce erosion
- Riprap provides protection from erosion by dissipating wave energy (refer to photograph above from the Mystic section of town).

Hard protections that are not parallel to the shoreline may include jetties and groins. Revetments are also common in Connecticut.

In order to include hard shoreline protection in a community, it is often necessary to inspect coastal structures such as bulkheads and seawalls; determine which structures are deteriorating and need repair; prioritize repair of structures based on condition and ability to protect property; and assess privately-owned coastal structures. Groton will continue to have areas that are protected by hard shoreline protection well into the future, including private properties and municipal facilities.

Living Shorelines

Living shorelines use non-structural shoreline stabilization to provide erosion control and enhance natural habitat. These are often created through strategic placement of plants, stone, sand fill, and other structural and organic materials. Living shorelines are not compatible with high-energy waters but may be appropriate for different parts of the Groton shoreline due to the somewhat protected nature of Long Island Sound.

Photo courtesy of Maryland Commission on Climate Change

The science surrounding living shorelines is young. In 2012, the Virginia Institute of Marine Science published the report "Ecological and Erosion Protection Functions of Chesapeake Bay Living Shorelines" in cooperation with NOAA, the Chesapeake Bay Trust, and the Maryland Department of the Environment. This report provides a number of design criteria and lessons learned from living shoreline projects.

Recent changes in Connecticut's coastal management laws (Public Act 12-101 described in Section 2.2) make the use of living shorelines more permissible along the state's shoreline by excluding them from the definitions associated with hard structures. In the coming years, Groton may wish to develop living shoreline projects to protect tidal wetlands that have been eroding[3].

Buffers for Near-Shore Flood Protection

The use of buffers in Groton is not a new concept. The Coastal Resources Setback is a type of buffer. The appeal of buffers relative to coastal resilience is that they provide space for flood mitigation and wave attenuation between tidal waters and structures or infrastructure. While buffers may not stop water from reaching a structure, research of

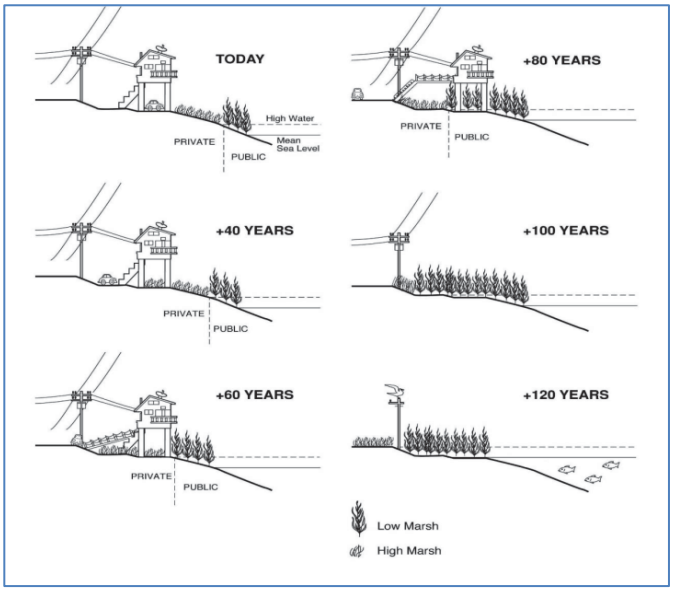
[3] The Town of Guilford has recently developed a living shoreline project to restore tidal wetlands and is seeking funding for its design and construction. The Connecticut DEEP has reportedly reviewed the conceptual design and has provided preliminary support.

coastal storm damage in the United States has shown time and time again that storm surges are slowed and waves are attenuated when buffers are available. Setting aside buffers between water and structures or between water and infrastructure is viewed as an important tool for Groton to continue and perhaps increase coastal resilience.

Land Acquisition and Conservation for Tidal Marsh Advancement

The benefits of acquisition are fairly obvious – if the appropriate land is acquired (in the best location and with optimal ground surface elevations), then tidal wetlands will have the best chance of adapting to sea level rise by migrating or advancing inland.

If land cannot be acquired for tidal wetland advancement, there may be opportunities to set aside the appropriate land through conservation easements and other arrangements. In some cases, this may occur through the use of rolling easements. In other words, Groton may not need to acquire private properties; instead, these properties would continue to remain in private ownership and tidal wetlands would be allowed to advance inland as structures are removed. This concept is depicted in the graphic to the right.



Graphic from Rolling Easements (Titus, 2011)

Roadway Adaptation

Roadway alterations in Groton may include elevation of roadways, abandonment of some roads, re-analysis of emergency access, and developing alternative egress for some areas.

- *Elevation of Roadways* – Roads can be elevated to remain viable while flood elevations increase. This has been done in many coastal communities along the east coast of the United States over the last century as sea level has been rising. The drawback to elevating roads is that private properties often remain at lower elevations and therefore remain flood-prone. A higher road surface can then impede drainage of floodwaters off properties. Cross culverts can be used to facilitate drainage under elevated roads. At significantly greater cost and effort, some roads can be elevated on piers or long bridges.

- *Abandonment of Roads* – Some communities may find it acceptable to abandon roads as the cost of elevating or maintaining a road becomes excessive. In some cases, complete abandonment may not be necessary, but Groton may allow a lesser level of maintenance. An example can be found at Pebble Beach in Rockport, Massachusetts. After many years of repaving a road at Pebble Beach that is prone to frequent washover, the town now maintains the road as unpaved and simply clears the surface after washover events.

- *Evaluation of Emergency Access and Routes* – Groton may abandon designated emergency access ways (without actually abandoning the associated road) while selecting a different route for emergency access or evacuations.

- *Developing Alternative Egress* – If pursued, developing alternate egress would likely be used in connection with abandonment of roads and/or re-assignment of emergency access.

The South Road underpass (pictured to the right) is an important accessway to and from the airport. It is floodprone and must be closed several times each year. The town eventually would like to make the airport's access more resilient.

Utility Infrastructure Adaptation

Utility adaptation in Groton will largely focus on vulnerable, low-lying wastewater infrastructure. Sewer pumping stations and the sewage treatment plant are most vulnerable.

- *Sewer Pumping Stations* – A number of sewer pumping stations are located in coastal SFHAs and are believed at risk to coastal flooding, including the Gravel Street pumping station pictured to the right. Risks will increase as sea level rises. Sewer pumping stations are susceptible to power outages, pump failures, overflows, and other problems when flooding occurs. Loss of sewer pumping capabilities

can lead to pollution and public health threats. Elevating equipment, building floodproofing, and on-site flood walls are the primary means of adapting sewer pumping stations.

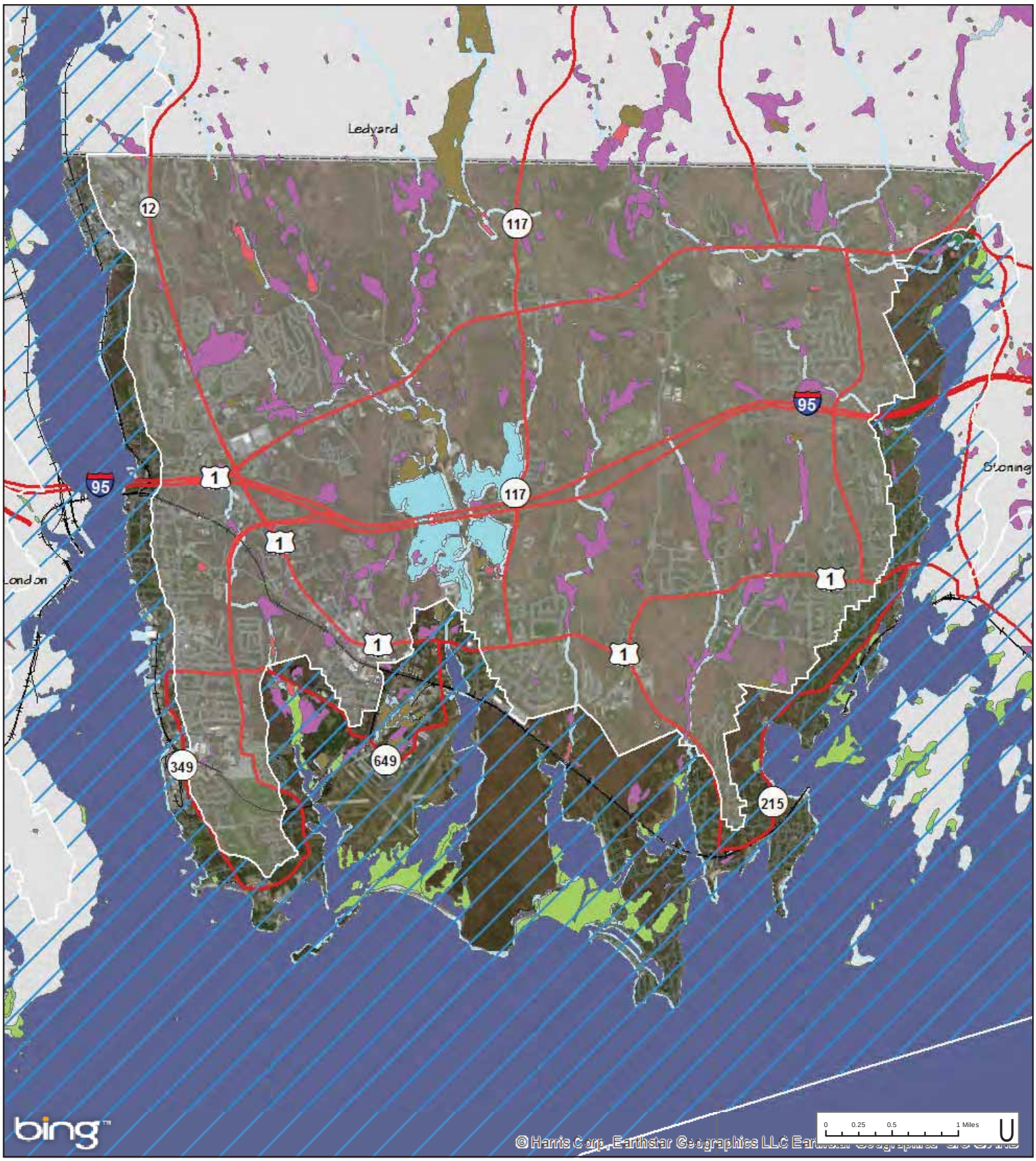
- *Sewage Treatment Plant* – Groton's water pollution control facility is located at the edge of the SFHA and partly in the 500-year coastal flood zone. Risks will increase as sea level rises. Treatment plants are susceptible to the same problems as pumping stations such as power outages, pump failures, overflows, and other issues. Elevating equipment, building floodproofing, and on-site flood walls are the primary means of adapting treatment plants, although the complexities of treatment plant sites may offer other means of adapting the sites.

The above discussion presents only the more typical methods of adaptation that are of interest in Connecticut communities. Over time, there may be other categories of adaptation that become necessary in Groton.

4.5 Tidal Wetlands

Groton is home to extensive tidal marshes, more broadly known as tidal wetlands. Some of the more extensive notable tidal wetland systems in Groton include the Birch Plain Creek tidal wetlands, which transition into the Baker Cove tidal wetlands; tidal wetlands located along the Poquonock River estuary; tidal wetlands located along Mumford Cove; tidal wetlands within Groton Long Point; and tidal wetlands located along Palmer Cove. These are depicted on Map 4-6. Further east, numerous pockets of marshes are located along Beebe Cover and the Mystic River ranging in size from many acres to less than an acre. Some of the smaller pockets of tidal wetlands are found in narrow bands between bulkheads and water, especially along the Mystic River, such as the small wetland pictured to the right.

Many of Connecticut's tidal wetlands are undergoing a transformation as sea level rise, erosion, altered tidal flushing, invasive species, and "sudden marsh dieback" collectively work toward degrading marshes from all sides. These issues are often interrelated.



Groton, Connecticut

Plan of Conservation and Development

Legend

- Coastal Management Area Boundaries
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Wetland Areas

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

Milone & MacBroom

- *Sea Level Rise* – Subsidence or drowning of tidal wetlands will occur in some places as a result of sea level rise where they can no longer accumulate peat fast enough to stay above sea level. In Connecticut, the effect will depend on location. According to Ron Rozsa of DEEP OLISP, sea level rise appears to be altering the zonation of plant communities in southeastern Connecticut where the tidal range averages 0.75 meters (approximately two feet). Studies have documented that at least two marsh systems are currently not keeping up with sea level rise. On Connecticut's western shore, with a tidal range of up to two meters (approximately six feet), extensive areas of low marsh vegetation have already been drowned (e.g., Five-Mile River, Norwalk).

  One effect of sea level rise is the tendency for marsh systems to advance landward where they are able to do so. In developed areas where seawalls, lawns, and other structures are at the existing edge of the marsh, landward movement will be limited. The basic assumption is that some high marshes will become low marshes. Many marshes will be submerged by the 2020s. In the 2050s scenarios, some upland will be wet. In the 2080s, water will have moved past (and inundated) marshes. Although it is believed that some marshes will be able to advance, a net loss is anticipated. Marshes will continue to be "squeezed" where they cannot migrate inland and, even where sufficient land is available for migration, sea level rise could be too fast for migration to occur.

- *Erosion* – Erosion of tidal wetland salt marshes is occurring in several parts of coastal Groton including marshes along the west side of Palmer Cove that are visible from Esker Point Park (refer to photograph below). Erosion events in a coastal setting are dependent upon many factors including sea level rise, surrounding conditions, storm events, human alteration of drainage and currents, and foot traffic. Some marsh erosion can be addressed with methods such as soft armoring, living shorelines, beach nourishment, and construction of boardwalks to reduce foot traffic. However, depending upon the location, implementation of any given solution may reduce erosion at one location while increasing erosion at another.

- *Phragmites Australis* – One of the primary threats facing tidal wetlands is the invasion of the Common Reed. *Phragmites* is an invasive species that often colonizes salt marshes upon human development or alteration of the landscape at or

surrounding the site. Undersized culverts, tide gates, and other factors may effectively limit tidal flow, allowing for the invasion of *Phragmites* to take place as the decrease in salinities and tidal flooding duration allows for the low-saline tolerant plant to survive. Consequently, *Phragmites* is often removed by restoring the natural conditions of the location before being impeded in some way. If solutions such as increased tidal flushing are possible, then the long-term elimination of *Phragmites* is possible. Otherwise, short-term solutions such as cutting and spraying *Phragmites* may be possible.

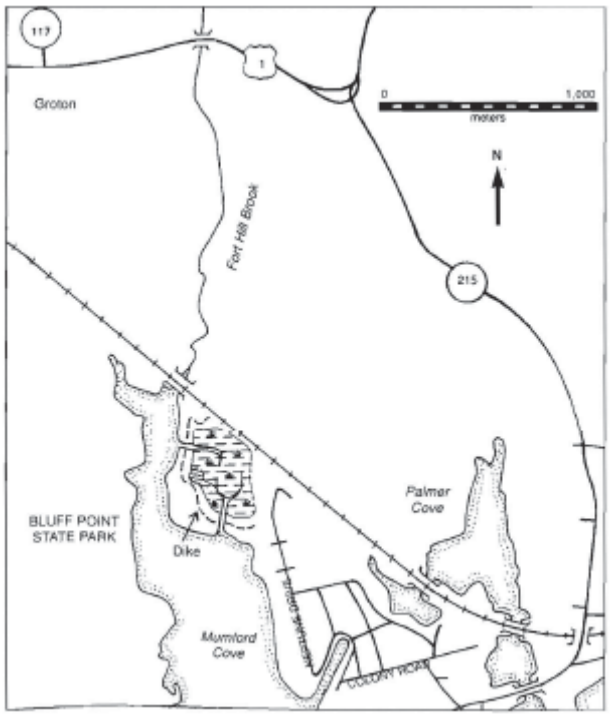
- *Tide Gates* – Tide gates were designed and installed at locations across the northeast in the early first-half of the 20th century. They were used for mosquito control, which was successful to a certain point. On the other hand, they were detrimental to tidal flushing and significantly altered flow regimes, sediment transport and species distribution. A number of questions surround the issue of whether tide gates should be open, partly open, or closed for optimal environmental health. Ultimately, tide gate management must be accomplished case-by-case with the priority objective in mind, whether it is flood control, *Phragmites* removal, water quality improvement, etc.

- *Sudden Marsh Dieback* – The salt marshes of the entire Eastern seaboard have been faced with a dilemma that is currently being termed by some scientists as "sudden wetland dieback." Although there is dispute between scientists surrounding what exactly is occurring, recent studies have suggested that marsh dieback may be connected to a 20-year tidal cycle. It is known that the health of salt marshes and the zonation of the vegetation which resides within the marshes are threatened. Results of salt marsh dieback include the development of tidal flats and pockets of holes in the absence of the various salt marsh grasses. The contributing factors which bring about these results are not fully known and include many possibilities.

Groton has been home to at least one notable example of tidal wetland restoration. According to “Tidal Restoration in Connecticut” by Ron Rozsa of DEEP OLISP, restoration has successfully occurred adjacent to Mumford Cove (refer to the graphic to the right, courtesy of DEEP). The following text is paraphrased from this reference:

In the 1950s, an earthen dike was built around a salt marsh located on the eastern shore of Mumford Cove, and sediments dredged from the cove were hydraulically pumped into the southern end of the marsh. These sediments spread across the marsh in a northerly direction, and excess water returned to the cove via a sluiceway located in the northwest corner. Fill depths across this 15 acre marsh ranged from two to four feet, elevations too high to be flooded by the tides. Phragmites became the dominant plant, and the ponding of rainwater produced large, uncontrollable broods of freshwater mosquitoes.

Restoration began in the fall of 1989 when the overburden of dredged sediment in the northwest corner was excavated by a lightweight bulldozer and transported to the adjacent uplands. Creeks and ponds were recreated using lightweight excavators. The following spring, the U.S. Fish & Wildlife Service joined the effort and provided equipment and operators to assist in the restoration. Over the next four years, the remaining wetland was unearthed, tidal creeks restored and wildlife ponds constructed. No planting was done, but vegetation re-established itself through the natural transport of salt marsh plant seed by the tides. Dense beds of the submerged aquatic plant Ditch or Widgeon Grass (Ruppia maritima), an important waterfowl food plant, spontaneously established in several of the ponds.



The preservation of tidal wetlands is desired in Groton. The town of Groton anticipates that there is a greater need for protecting existing tidal wetlands and providing space for marsh advancement rather than conducting marsh restoration projects such as the one described above in Mumford Cove. Fortunately, there is considerable open space already located adjacent to tidal wetlands in some locations such as the east bank of Poquonock River along Bluff Point, the east and west shores of Mumford Cove, parts of Groton Long Point, and portions of the west side of Palmer Cove. However, tidal wetlands will not be able to advance in all of these areas simply because space may be available. The success of marsh advancement depends on the existing grades and ground surface elevation in these open spaces.

The following existing open space properties should be evaluated for the feasibility of providing appropriate areas for marsh advancement, and then targeted for marsh advancement projects (projects that aid in the advancement of marshes such as grading and invasive species control):

- Thomas Road open space
- Bluff Point State Park
- Haley Farm State Park

Developed shorefronts in Noank and Mystic will provide only limited opportunity for marsh advancement, if any. Thus, there are areas in Groton where extra space for marsh advancement is desired. The Birch Plain Creek corridor is one such area. The following areas should be evaluated for the feasibility of providing appropriate space for marsh advancement:

- Birch Plain Golf Course (zoned industrial) on the east side of Birch Plain Creek
- Properties on the southeast side of Thomas Road (zoned industrial) along a tidal creek tributary of Birch Plain Creek
- Property between the Mumford Cove homes and the Amtrak line (zoned residential) on the west side of Palmer Cove
- Properties at the north end of Palmer Cove near Haley Farm State Park (zoned residential)
- Properties on the east side of Noank Road north of the intersection with Cedar Road (zoned residential)
- Properties at the head of the Mystic River (zoned residential)

Finally, the margins of the airport (state-owned land) might provide space for marsh advancement. The margins of the airport should be evaluated for the possibility of allowing such advancement, either passively or as aided by grading. In particular, the east side of the airport property appears to have fewer potential conflicts relative to the future uses identified in the airport master plan.

4.6 Water-Dependent Uses

According to DEEP, one of the cornerstones of Connecticut's coastal management program is promoting water-dependent uses of waterfront sites. The CCMA defines "water-dependent uses" as land uses that require direct access to coastal waters in order to function, including, but not limited to, marinas, commercial fishing operations, water-borne transportation facilities, and uses which provide general public access to marine or tidal waters. Such public access uses, and the facilities that support them, might include a place for the public to fish or launch a kayak, an observation deck to watch salt marsh birds stalk their prey, or an urban waterfront seating area for viewing cargo ships leave port.

The CCMA requires that municipal land use authorities give highest priority and preference to water-dependent uses at waterfront sites. When reviewing proposals at waterfront sites, municipal land use commissions must determine whether or not a site can accommodate a water-dependent use. In situations where site constraints will not allow the development of an active water-dependent use such as a marina or a commercial fishing operation, the site may be suitable for providing meaningful

opportunities for the public to access the site's waterfront for recreational use. Public access is discussed below.

Groton currently enjoys many water-dependent uses including commercial boat yards and commercial marinas. Examples include Spicer's Marina, Noank Village Boat Yard, Fort Rachel Marina, Noank Shipyard and Seaport Marine, and Palmers Cove Marina. Groton also hosts many public boat launches that accommodate car-top boats and trailer-mounted boats. In the face of increasing coastal hazards, the town of Groton may need to team with its water-dependent businesses to encourage adaptation and help build resilience.

While it is not realistic to believe that many *new* water-dependent commercial uses will be developed in Groton, there may be opportunities for some to return to Mystic. For example, some former water-dependent uses in Mystic (buildings on the waterfront such as the building pictured to the left) are currently occupied by businesses that are not necessarily marine-related. Water-dependent uses are typically more resilient to coastal hazards than offices, and it may be practical to relocate water-dependent businesses to these buildings over the long term.

4.7 Public Access

Aside from water-dependent uses, provision of public access to the waterfront is one of the cornerstones of coastal management and it has historically been a controversial topic in Connecticut. It is clear from coastal access surveys administered by DEEP over the years that the general public believes that public access to the waterfront must be improved and strengthened throughout the state.

The Town of Groton is generally considered to have abundant opportunities for coastal public access. Chapter 4 of the previous Plan of Conservation and Development (2002)

notes that *"coastal access opportunities (such as at Bluff Point) differentiate Groton from many other communities and are a major amenity for the community. Moreover, Groton has also been a leader within the State in obtaining coastal public access opportunities. These efforts should continue and be integrated into the open space greenbelt and trail system so that more of the coastline along the Thames River, Long Island Sound, and the Mystic River are available for public access."*

Groton residents benefit from facilities and open space owned and maintained by State, Federal and private entities. Two interconnected state parks (Haley Farm and Bluff Point) provide more than 1,000 acres of coastal open space, and approximately 30 coastal access points are identified on the DEEP coastal access web site.

The Groton Parks and Recreation Master Plan (2009) notes that "Groton's unique location on Long Island Sound between the Thames and Mystic Rivers provides access to some of the best boating opportunities in the region and the country. In addition to the natural amenities provided by the area, Groton has wonderful boating facilities at Spicer Park in Beebe Cove to support rowing activities. The Town owns and manages the facilities at Spicer Park and works in partnership with an advisory board of citizen experts to offer programs to the public. Boating programs include a variety of activities for all ages and capabilities, including rowing (sweep and scull), adaptive kayaking, sailing lessons, as well as family and youth boating." The plan also notes that in 2008 the Town of Groton offered 46 boating programs and activities, which attracted 289 enrollments.

Nevertheless, the survey conducted in 2013 for the Plan of Conservation and Development update revealed a few key points regarding public access to the shoreline and water. More than half of survey responders (58%) stated that "too few" public beaches are available in Groton. Exactly 30% of responders utilize Groton's "public beaches" (not just one specific beach) less than one time each year, whereas about 24% use them monthly and another 24% use them on a weekly basis. Regarding the town beach, 23% of responders stated that the quality was good but the park needed some upgrades. An equal numbers of responders (17.8%) stated that the public beach had good quality when compared to the number of responders who stated that the quality was poor (17.3%). Several responders stated that beaches should be served by bus stops. Approximately 53% of survey responders stated that the town has an appropriate number of public boat launches. Finally, approximately one-third of responders believe that Groton should acquire new open space to access the shoreline.

Numerous locations of public access to the shoreline are located in the Town of Groton. Refer to Map 4-7 for a location plan. This section describes some of the more prominent access sites. Many of the descriptions of public access lands are taken from the Parks and Recreation Master Plan. From west to east, the points of public access to coastal resources are as follows:

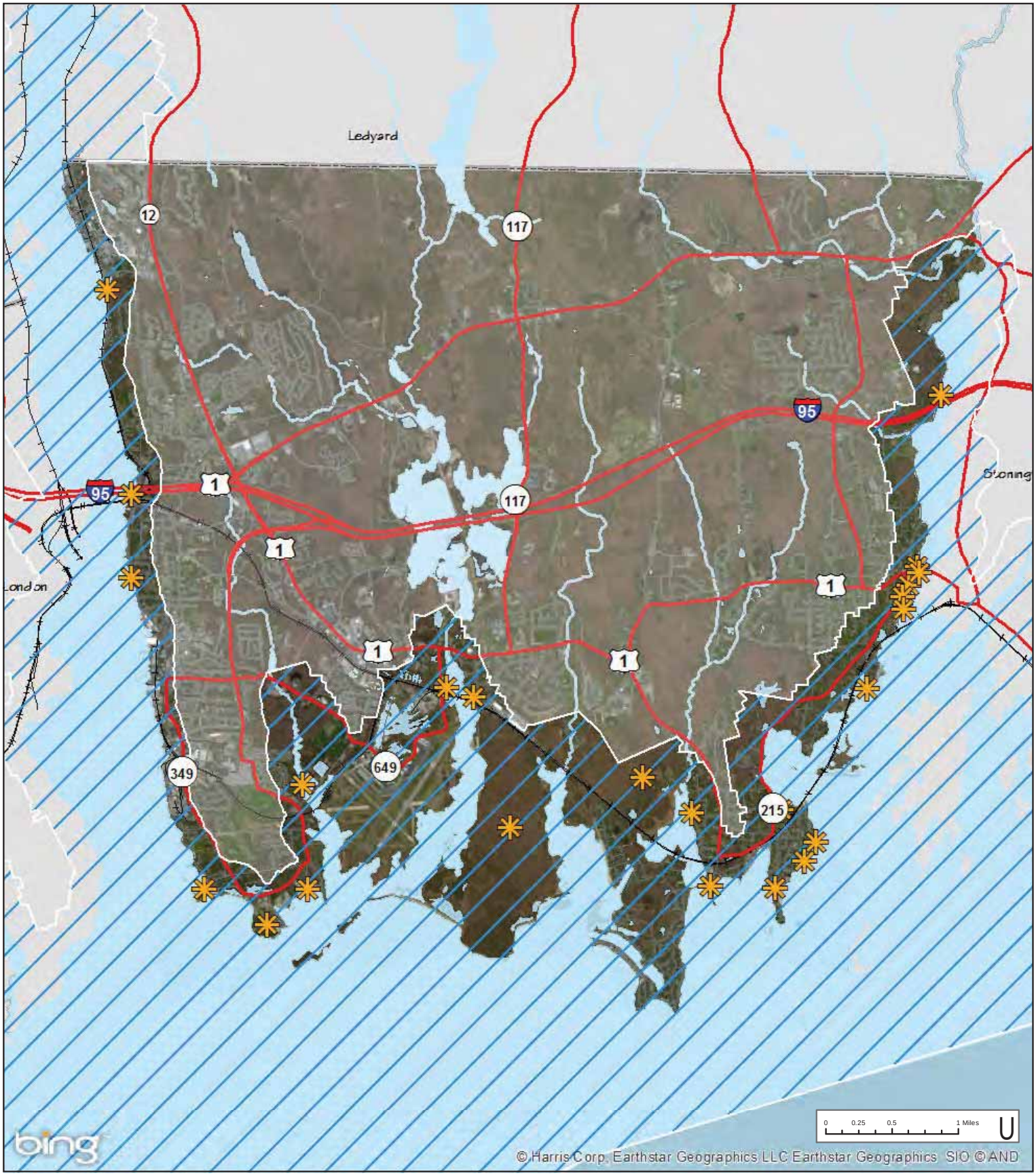
- USS Nautilus Memorial Museum – Located at the end of Crystal Lake Road just outside the main gate of the U.S. Naval Submarine Base, the Nautilus Memorial offers visitors an opportunity to tour the museum and take a self-guided tour of the world's first nuclear powered submarine, the USS Nautilus. There is a picnic area on the grounds with views of the Thames River. Admission and parking are free.

- Nautilus Parklet – This scenic overlook is located on Military Highway south of the Nautilus Memorial entrance. Overlooking Goss Cove with unobstructed views of the Thames River and Mamacoke Cove, this parklet contains picnic areas, a scenic walkway and public parking.

- Burrows Field Park and Peruzzotti Boat Launch – Includes a heavily-used Little League field and a boat ramp access point for the Poquonock River.

- Poquonock River Walkway – The 2,000-foot long Poquonock River Boardwalk provides for a scenic stroll and a convenient route for bike commuters. It is an important link in a planned east-west bike route. The photograph to the right is a view of the walkway from the Peruzzotti Boat Launch.

- Bluff Point State Park and Haley Farm State Park – the state of Connecticut owns two connected coastal open space parks: Haley Farm State Park (at 241 acres) and Bluff Point State Park and Coastal Reserve (at 790 acres). Both parks allow passive recreation and have extensive trail networks. Bluff Point is reportedly the largest coastal reserve in Connecticut and one of the largest protected natural resource areas on the eastern seaboard. Bluff Point and Haley Farm attract visitors from the across the region for hiking, mountain biking, horseback riding, picnicking, bird watching and cross country skiing. Bluff Point also attracts fishermen, clamming, kayaking and includes a half mile long beach approximately one mile from the parking area.



Groton, Connecticut

Plan of Conservation and Development

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

Legend

Coastal Public Access

Public Access

Coastal Management Area Boundaries

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

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- Esker Point Beach and Waterfront Park – These facilities take their names from the glacial deposit of gravel known as an "esker" that runs along the west side of the park and shelters the beach from the rougher waters of Fisher's Island Sound. The park occupies both sides of Groton Long Point Road just east of the causeway leading to the community of Groton Long Point. The north side contains a 2.5 acre parking area, two basketball goals on the north edge of the lot, and a narrow water front park on the eastern shore of Palmer Cove. The waterfront park was developed in 2005 to provide kayak/canoe access and includes benches, picnic tables, a stone dust path, signage and a port-a-let. A cross walk over Groton Long Point Road provides pedestrian access from the parking lot to the beach area.

The beach includes approximately two acres of sand with 400 feet of beach frontage. The sand is well maintained and transitions to submerged silt on a gradual descent into the calm water of Smith Cove. The Town does not provide life guards. A concession/ restroom building with an exterior deck is operated by a seasonal vendor. A grove of hardwood trees adjacent to the beach shelters a picnic area containing tables and grills. In the open sand north of the beach-front are eight volleyball nets used by an adult summer league and the public. During the summer, the popular Groton Summer SoundWaves Concert Series occurs on Thursday evenings, filling the beach and picnic area with concert-goers.

Esker Point Beach occupies an exceptional site on the edge of Fisher's Island Sound providing residents and visitors with swimming, sunbathing, kayaking, picnicking and other recreational opportunities. Views of West Cove and its mooring field, Palmer Cove, and surrounding shorelines provide a compelling destination for the public. The park displays a mix of new and old facilities. The concession building seems to serve

its seasonal purpose adequately, but suffers from an antiquated appearance of whitewashed concrete block walls. Since the backside of the building faces the street, its appearance could be improved by landscaping. Additionally, the parking lot could be greatly improved by infilling with landscape islands that better delineate internal circulation and absorb storm water. Since the parking lot is only filled to capacity during summer concerts, reduction of the paved area in favor of other uses may be worth consideration. Other areas are worthy of improvement include the crossing at Groton Long Point Road, which needs better legibility and improved approaches on both sides; additional amenities such as a playground may be desirable; and the geology of the site and ecology of the surrounding estuaries could be interpreted through signage or other means.

- Tanglewood Open Space – This 3.6-acre parcel is located on Palmer Cove in the Tanglewood Subdivision, and contains a play area and unimproved small boat launch. This open space area offers panoramic views of Palmer Cove. A vehicle turn-around is provided. Limited parking is available, pictured to the right.

- Palmer Court Public Access in Noank – This site is located within a municipally owned right-of-way, and a stairway extending from the corner of Palmer Street and Riverview Avenue brings visitors from an escarpment to a small beach several feet below, which overlooks Mystic Harbor.

- Main Street Dock and Beach – The Noank Town Dock offers residents and visitors access to the bank of the Mystic River at the foot of Main Street. A recently renovated dock allows tie-up for skiffs and a tiny sand beach is used mostly by local families. The site was fully renovated in 2007 with curbing, lighting, benches and signage.

- Spicer Memorial Park – This park serves the surrounding Noank neighborhoods and is a boating facility for all Town of Groton residents. The protected water of Beebe Cove offers a setting for sculling and rowing. The Fitch High School Rowing Club uses the facility as a practice site and the boat house provides storage for shells.

- Mystic Shipyard – This 50 foot wide right-of-way provides public access from Essex Street easterly to the Mystic River. Because the site is a working shipyard, access is confined to a designated 50 foot wide right-of-way only and a walkway in front of the yacht club building.

- Fort Rachel Marine – Located at the southern end of Water Street, this is a working boatyard with a small number of boardwalks open to the public. Parking is not available.

- Carijas – This property offers a grassy lawn area from which visitors can view the Mystic River. Parking is not available.

- Water Street Public Dock and Launch – Located on Water Street in the Fort Rachel area, this facility (pictured to the right) includes a small boat launch and dock. Parking is not available.

- Randall's Wharf Condominiums Walkway and Powerhouse Condominiums Walkway – A gravel path along the Mystic River winds its way from Water Street past Randall's Wharf Condominiums to the Powerhouse Condominiums (photograph to the right). Benches are provided. The pathways are on private property, but an easement allows the public to enjoy the views of a marina and the Mystic River. Parking is not available.

- Mystic Art Association – Located off of Water Street between Steamboat Wharf and Powerhouse Condominiums, this site offers public access behind the Art Association building along the Mystic River. A parking lot is available.

- Steamboat Wharf Condominiums – This condominium complex offers boardwalks from Route 1 extending past the condominiums to the Mystic Art Association property. Benches are provided and paid parking is available.

- Gravel Street Pump Station – Benches are provided at this pump station site located on Gravel Street adjacent to the Mystic River. This area offers views of the Mystic River drawbridge and Mystic Seaport. Paid public parking is available.

- Mystic River Scenic Overlook – This overlook provides views of the Mystic River and Mystic Seaport from Interstate 95. Access to the water is not provided.

- Mystic River State Boat Launch – Located under the I-95 overpass, this site offers boaters views of the Mystic River corridor and is also a popular fishing site. The site, pictured to the right, is well-suited to small car-top vessel launching. Trailer parking is extremely limited.

- River Road – The 39.84-acre River Road tract is wooded with mature hardwoods and has frontage on River Road and a narrow strip of coastal wetland on the Mystic River. Parking areas, identifiable access points, and identifying signage are not available. Trails are reportedly unplanned and fragmentary and the property is virtually unused for recreational purposes. The property abuts the State-owned Mystic Education Center. Amenities such as designated access points, small parking areas, park and directional signage and designated trails may improve the availability of natural resource-based passive recreation for town residents.

The Parks and Recreation Master Plan notes that the majority of Groton residents seeking passive recreation utilize one or both State Parks instead of Town of Groton lands. The State has historically underfunded the maintenance of its state parks and both Haley Farm and Bluff Point show signs of trail erosion, and high use. The town believes that better utilization of its own town-owned natural resource areas could relieve some of these pressures on the State parks.

One group underserved by the Town's open space areas are physically handicapped users. With exception of the Bluff Point State Park's main trail and a short section in Haley Farm, there are no handicap accessible trails into natural resource areas throughout the Town. The Poquonnock River Boardwalk can accommodate wheelchair users, but was not designed with wheelchairs in mind and thus there are no unimpeded views or areas to pause or turn around.

Despite the numerous locations for public access to the shoreline and the waters offshore, some areas (such as Groton Long Point) will continue to be unavailable to the general public, while other areas may be publically available yet challenging to access for some people. As a result, the town must continue striving for provision of diverse and spatially distributed public access to the shoreline and water. The Noank Harbor Management Plan notes that the ends of several public roads have direct frontage on the sound, such as

Main Place, Cove Street, Spring Street, Chesbro Avenue, Palmer Court, Main Street, and Wilbur Court; these may be available at some time for public access. The Noank Harbor Management plan also notes that a small parcel of land off Riverview Avenue is town-owned.

Few locations in Groton appear to be available for providing public access in the future where it is not currently available, and few opportunities for developing new public access will be available in the next few decades. Therefore, the Town must maximize the promotion and usage of existing sites and provide parking when possible.

4.8 Water Quality

Connecticut's coastal water quality is believed to have improved over the years as advances in wastewater treatment have been implemented in many communities and along major tributaries to the Sound such as the Connecticut River. Coastal nonpoint source pollution in Connecticut is addressed through a number of programs including the State's Clean Marina Program, Clean Boater Program, municipal stormwater management programs, and adoption and promotion of the *2004 Connecticut Stormwater Quality Manual.*

The Connecticut DEEP currently conducts sampling at approximately 50 sites in Long Island Sound and uses the data to assess long term trends in water quality and draft the State's impaired water list every two years. Two sites are located in the lower Thames River and two are located just offshore. The *2012 Connecticut Integrated Water Quality Report* can be found on the DEEP web site at http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2012_iwqr_final.pdf.

Several segments of coastal Groton were listed in the report. These are Inner Mystic Harbor, Beebe Cover, Palmer Cove, Mumford Cove, West Cove, Bluff Point, Inner Poquonock River, and Inner Baker Cove. Most of these segments were not assessed for aquatic life support or recreation; one (Mystic Harbor).had insufficient information for assessing aquatic life support but was fully supporting for recreation. Most were not supporting direct consumption or commercial harvesting of shellfish, although Mystic Harbor was fully supporting commercial harvesting of shellfish. Individual causes of impairment were listed as follows:

Table 4-4
Impaired Waters

Listed Water Body	Impaired Designated Use	Cause
Beebe Cove	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform
Palmer Cove	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform
Mumford Cove	Commercial Shellfish Harvesting Where Authorized	Fecal coliform
Inner Poquonock River	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform
Inner Baker Cove	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform
West Cove	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform
Bluff Point	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal coliform

The section of the Thames River adjacent to the Town of Groton has two listed impaired uses – commercial shellfishing and aquatic habitats – with causes ranging from bacteria to poor dissolved oxygen due to industrial point discharges, municipal discharges, illicit discharges, remediation sites, and/or groundwater contamination.

The report notes that all of the Groton segments described above were year 2013 priorities for developing Total Maximum Daily Loads (TMDLs). According to the Statewide Bacteria Impairment TMDL Fact Sheet (2013) at http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/fs5appendices.pdf, shellfish TMDLs were adopted for the following Groton segments in 2013: Beebe Cove/Mystic Harbor, Palmer Cove, Inner Mumford Cove, Outer Mumford Cove, Poquonock River, Baker Cove, West Cove, Bluff Point, Thames River, and Alewife Cove. The adoption of TMDLs for coastal Groton implies that the DEEP will be looking for opportunities to improve coastal water quality in the coming years.

The Town of Groton is required to address the impacts of stormwater runoff by developing and implementing a Stormwater Management Plan (SWMP). The Town's SWMP meets the requirements of the DEEP General Permit addressing stormwater management, which is consistent with EPA's Phase II stormwater regulations for communities located in urbanized areas with populations of fewer than 100,000 people. The SWMP is a long-term initiative with the goal of improving the overall quality of the Town of Groton's stormwater runoff. The Town designed its own SWMP to develop and

implement best management practices (BMPs) for the following six minimum control measures:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-construction Stormwater Management in New Development and Redevelopment
- Pollution Prevention and Good Housekeeping for Municipal Operations

Despite the progress in stormwater management in Groton, improvements are desired. There are areas in the town where stormwater outfalls are located in close proximity to coastal waters or directly at the edge of coastal waters. For example, several stormwater outfalls in the Mystic section of town are located in block walls lining the Mystic River or at the edges of paved surfaces (pictured below). Stormwater from town roads will discharge directly from these outfalls during precipitation events, carrying roadway pollutants and sediments directly into coastal waters.

When the town completes major projects along its roads, it should look for opportunities to retrofit stormwater systems and avoid direct discharges to coastal waters. Many methods of stormwater management are presented in the Groton Utilities Drinking Water Quality Management Plan (DWQMP). Some of these methods may be applicable to the coastal areas of Groton. Additional ideas may be drawn from the *2004 Connecticut Stormwater Quality Manual.*

Stormwater management strategies such as those listed in the DWQMP should also be considered throughout the town, including inland sites, because all of Groton's watercourses eventually drain to coastal waters. The town has closely controlled

stormwater management at the Mystic Marriott and the Great Brook subdivision within the last decade, demonstrating a capacity to successfully influence stormwater management through its land use commissions.

4.9 Buffers and Setbacks

Section 6.8 of the Groton Zoning Regulations is the Coastal Resources Setback section. This section prohibits new building construction, including minor additions to or modifications of existing buildings or detached accessory buildings, such as garages, utility sheds, pools, tennis courts, or parking lots within 50 feet of any of the following coastal resources: coastal waters, tidal wetlands, coastal bluffs, escarpments, beaches or dunes. The section does not apply to the Waterfront Design District or water-dependent uses, which need to be located at the edge of water.

As explained in Section 4.1, Groton's boundaries include all of the state's recognized coastal resources. The potential impacts to these resources differ when faced with impacts from development. Buffers are needed to protect many if not all of these resources from changes that may be caused by adjacent uses on land, but those buffers may not need to be the same width to provide the needed protection.

It should be noted that a setback and a buffer are not the same. A "setback" is an area in which little or nothing can occur. Groton's setback of 50 feet from certain coastal resources is generally viewed as a "no go zone." A buffer is an area adjacent to a resource of concern that is usually undisturbed or planted with appropriate species to help protect the resource, and it may or may not have the same width as a setback.

There are a number of different setbacks that communities across Connecticut's shoreline have used. Many have rigid setbacks such as 25 to 50 feet (or greater). With the wide variety of lot sizes in Groton and the variety of coastal resources, it is possible that a sliding scale setback could be useful for achieving some level of resource protection when lots are very small and a higher degree of protection when lots are larger.

Aside from enforcing setbacks for new construction, Groton may also attempt to achieve the creation of buffers on existing developed properties. Buffers can (1) reduce stormwater runoff to the edge of water, which can have water quality benefits; (2) protect vulnerable structures and infrastructure from coastal hazards; and (3) provide space for marsh advancement.

Rolling easements were described in Section 4.3. Rolling easements allow for inclusion and use of buffers and setbacks, but allow them to move and eventually displace a structure. The concept of a rolling easement is to accommodate development in shoreline areas while requiring a legal understanding of the owner that the land will likely not remain dry in the future. A rolling easement allows construction near to the shore, but

requires the property owner to recognize nature's right of way to advance inland as sea level rises.

Groton's coastal site plan review process should continue to strive for requiring compliance with the Coastal Resources Setback and inclusion of wide buffers between development and coastal resources.

Although a sliding scale setback does not appear necessary at this time, Groton should continue to look for opportunities to adopt a variable setback if neighborhood-specific issues should arise in the future, such as redevelopment pressures in areas with very small or large lots. In some cases, a smaller setback may be allowable if lots are very small and resources can be protected with appropriate vegetated buffers. In other cases, a larger setback may be appropriate if resource values are high and sufficient land is available.

4.10 Density and Views

Some of Groton's coastal neighborhoods were originally developed as summer colonies with modest homes. Within these neighborhoods, homes built for year-around use were also quite modest. On the other hand, areas such as Mystic and Noank were developed with larger homes when these neighborhoods were busy ship-building and maritime centers.

Housing density, sizes, and protection of views are typically important issues in coastal management areas throughout Connecticut. New construction and substantial restoration of existing housing can often be perceived as out of scale with historical patterns of development and as having an adverse effect on the views, use and enjoyment of the coastal environment by residents and visitors. This is somewhat true in Groton as well. Signs of major renovations are often visible in Mystic and Groton Long Point. Zoning controls on building size and scale typically include the following types of criteria:

- Building coverage – the size of the building(s) footprint expressed as a percentage of lot area.
- Floor area ratio – the total size of the building(s) (all floors) expressed as a percentage of lot area.
- Building height – height above ground.
- Setbacks – the minimum distance from lot lines (or other land features such as wetlands) required for any building.

These standards usually vary according to overall density of development allowed, usually expressed as the minimum lot size required. In smaller lot zones the coverage and floor area ratio requirements are usually higher (in percentage terms) than in larger lot zones. Building height limits are usually uniform in all zones and setback requirements usually increase with large lot sizes.

The Groton Zoning Regulations restrict residential building heights to 30 feet except where three-story residential units are allowed. Front yard, side yard, and rear yard depths vary by zoning class as do the lot sizes and allowed lot coverage. The smallest yards are possible in the RS-8 district where the minimum lot size is 8,000 square feet with a total width of 60 feet and a side yard of width six feet. Required side yard widths in the other residential districts range from 12 to 25 feet.

The Waterfront Design District is the only zoning district that specifically mentions views in the regulations: "*The Mystic River is the most vital element within the WDD and as such must be given primary consideration in any proposed development. To this end, special consideration must be given to the area of the water and land interface; the preservation and creation of views from public and other areas to the water, and the preservation and integrity of the existing river bank. Pedestrian access to the river's edge should be encouraged from Main Street south to the railroad bridge.*"

At the present time, the current Zoning Regulations are believed appropriate for protecting views of the shoreline and promoting reasonable renovations and construction of structures in the coastal management area. The town will monitor development applications and act accordingly if regulations should be changed to protect neighborhood building densities and views. Some potential methods of addressing views are described below, based on other coastal communities in the United States. The heights and widths used in the examples below may not be directly appropriate in Groton, but provide a general idea of how these controls may work.

- *Zoning Regulations Definitions* – "Visual corridor" could be added to the definitions. This is an unobstructed area extending from a public right-of-way to the shoreline which is retained at grade and landscaped in such a manner as to permit and encourage views of the water.

- *Design Height Limitation in Coastal Areas* – No structure within a 150 feet of the coastal jurisdiction line may have its maximum height to ridge line greater than 30 feet above the base flood elevation or average finished grade, whichever is higher.

- *Visual corridors* – Where a lot or parcel is located between the shoreline and a public roadway, an unimpeded visual corridor of 20% of the width of the lot (up to 100 feet maximum) shall be provided on one side of the parcel. The minimum width of said visual corridor shall be 20 feet. Parking, accessory or ancillary structures shall not be permitted in said viewing corridor. Landscaping shall be used to promote views of the water as seen by a person standing beside or on the public roadway and to enhance the view of the land as seen from the water. Where a parcel is located adjacent to a street that ends at the shoreline, the applicant may be given credit for half of the right-of-way in calculating the visual corridor width if facilities such as

docks, piers or observation decks open to the general public are provided with appropriate provisions for their maintenance.

- *Setbacks for View Protection* – The minimum shoreline setback shall be 30 feet for building elevations not exceeding 40 feet in height measured vertically from the mean high water line to top of the building parapet. The shoreline setback shall be measured from the edge of water. For building elevations exceeding 40 feet in height measured vertically from the mean high water line to the top of the building parapet, the minimum shoreline setback shall be increased by 50% of the additional height of the building to a maximum setback of 75 feet. Said setbacks shall be measured from the edge of water. Water dependent uses shall be permitted within said shoreline setbacks. No buildings, accessory uses, belowground structures, ancillary structures or other, uses shall be allowed in the setback area described above. However, if public shoreline walkways are provided, along with covenants and provisions to ensure public use and maintenance of these walkways in perpetuity, then the shoreline setback shall be decreased.

4.11 Open Space and Coastal Land Acquisitions

The town of Groton is relatively rich in coastal open space. Lands such as Bluff Point and Haley Farm are large dedicated open spaces that are at low risk to future development. Recent open space acquisitions have added important coastal lands to the open space in town, including the Thomas Road open space known as Sparkle Lake Conservation Area.

The town desires additional coastal lands for marsh advancement and public access. When new parcels of land are available for acquisition, they should be evaluated in the context of this coastal program and a determination should be made whether the parcels may have significant values relative to marsh advancement potential and public access. For example, the list of properties at the end of Section 4.5 may be most appropriate for tidal marsh advancement.

When coastal lands cannot be acquired, it may be possible for the town to secure open space through other arrangements such as conservation easements. The town should prioritize these lands in the same way, targeting open space designations where tidal wetlands may be able to advance or where public access may be possible in the future.

The town must leverage a variety of funding sources to obtain open space. For example, acquisition of storm-damaged properties was described in Section 4.2 of this document. FEMA mitigation funds can be used to obtain private properties with the agreement that the structures be removed and the properties converted to open space. Many coastal communities in Connecticut have been pursuing acquisitions of residential properties using HMGP funds available as a result of Hurricane Sandy.

4.12 Program Administration

Some municipalities in Connecticut have found that coastal management is more straightforward when the coastal boundary is adopted as an overlay zone. An example is the neighboring Town of Stonington. Groton has only one overlay zone at the present time – the Water Resources Protection District – although the coastal boundary is treated somewhat as an overlay zone. Consider Section 5.1-1 of the Zoning Regulations which states that "In addition to the Table of Permitted Uses, Section 8.4-2 Coastal Site Plan Review and Section 6.12 Water Resource Protection District should be consulted to ensure compliance with these regulations." The text of this passage implies that the coastal boundary carries additional review requirements, which is similar to an overlay zone.

If Groton were to adopt a "coastal resource management overlay zone" it could be used to require some of the concepts discussed in this document. For example, if the town were not interested in adopting freeboard for flood mitigation on a townwide basis, it could be required in a coastal resource management overlay zone and therefore help result in coastal flood mitigation. More stringent stormwater management, low impact development, and adaptation methods for sea level rise and coastal resilience are other themes that can be addressed through an overlay zone.

Notwithstanding the possibility of establishing an overlay zone for coastal management, Groton's existing Coastal Site Plan Review process (described in Section 2.3) is believed sufficient for guiding development in the coastal boundary. The town has been able to secure public access in conjunction with many development and redevelopment projects, and has strived to protect coastal resources through setbacks. The eight types of exemptions from the Coastal Site Plan Review are similar to the exemptions found in other coastal Connecticut municipalities, although some towns have shortened the list slightly by reducing the types of exemptions. If Groton finds that some of the exemptions have resulted in adverse impacts to coastal resources or reduced the town's coastal resilience by introducing increased flood risk, then the town should consider strengthening the list of exemptions.

Finally, Groton may wish to consider that Coastal Site Plan Review applicants be required to describe the benefits of their proposed development or redevelopment projects. The City of New Haven began requiring a description of coastal benefits

subsequent to the update of its Municipal Coastal Program in 2006. Proposals must be accompanied with a statement that describes how the project will not only protect, but may provide benefits to coastal resources relative to existing conditions. For example, stormwater management may be improved. Proposals should also describe community and neighborhood benefits such as increased public access, if applicable.

5.0 GEOGRAPHIC CONDITIONS, ISSUES, AND STRATEGIES

For the purpose of examining coastal land use issues and concerns in a geographic context, the coastal management area has been divided into eight "subareas" corresponding roughly to neighborhoods. Refer to Map 5-1. The Groton Long Point and Noank political subdivisions are included but the City of Groton is not, given the city's more independent status relative to planning and the review of coastal site plan applications.

This chapter describes *existing resources, coastal issues and concerns in the 21st Century, strategies and recommendations,* and *proposed land use* for the eight subareas. Important issues for the 21st Century were identified through research of existing planning studies and documents as well as thorough public outreach.

Three areas in Groton were further evaluated with "area plans" developed for each. These area plans list specific strategies and recommendations that are based on the coastal management concerns and general strategies described in Chapter 4. The area plans are found in Appendix B.

5.1 Navy Base

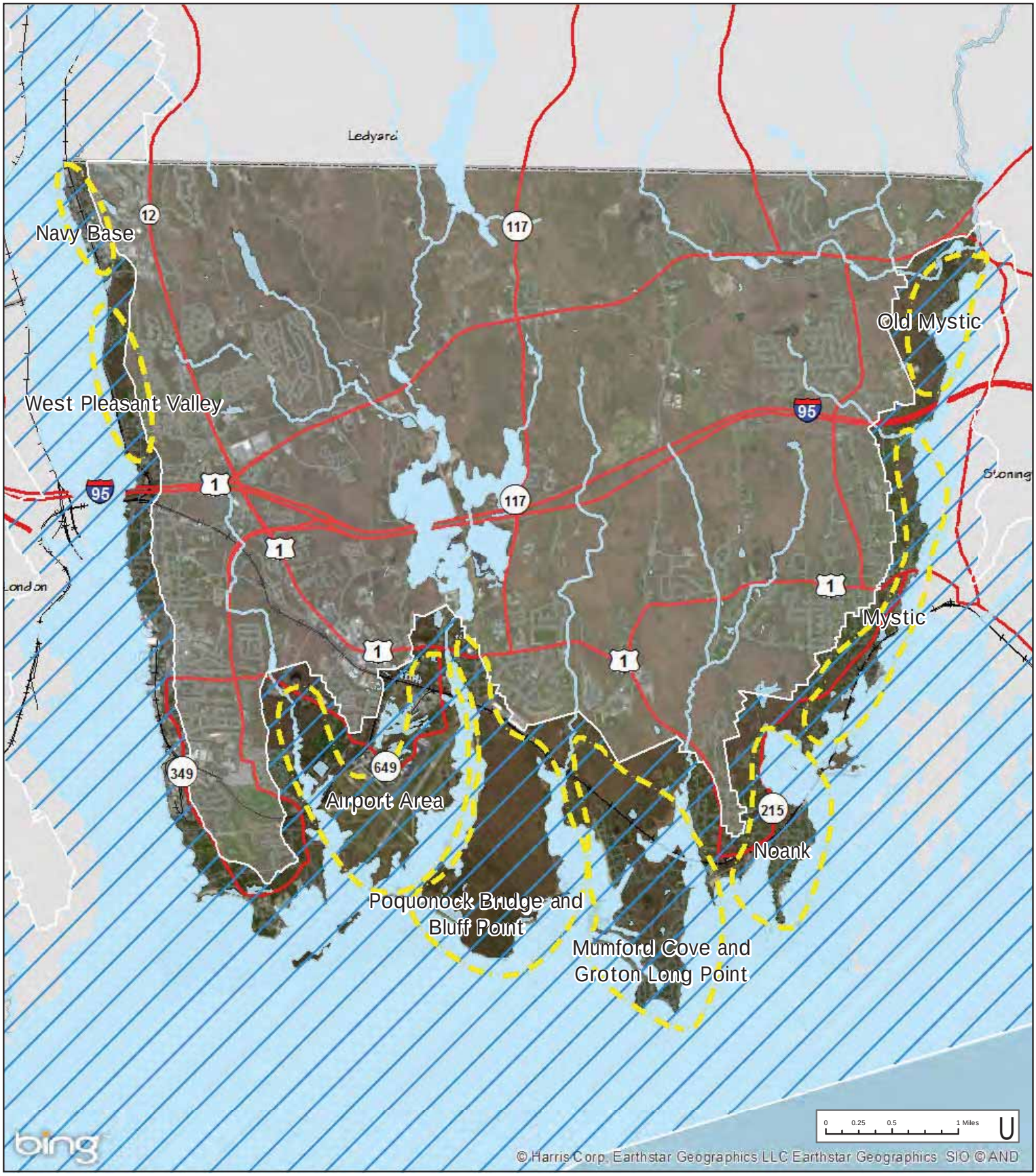
The coastal area associated with the Navy Base lies along the Thames River extending from the Ledyard town line to Crystal Lake Road. The entire area is owned by the federal government. Public access is available at the USS Nautilus Memorial Museum.

Existing Resources

Coastal resources are limited, as the shoreline of the Thames River is developed in the Navy Base. Water-dependent land uses line the riverfront.

Coastal Issues and Concerns in the 21st Century

The most significant coastal management issue is that Navy redevelopment proceed in a manner that is sensitive to the close relationship with the Thames River. Other traditional concerns of municipal coastal programs, such as the promotion of public access (which is not possible except at the USS Nautilus Memorial Museum) and protection of tidal wetlands are not applicable in the base. Even coastal hazard resilience is not a significant issue on the base, since the coastal high hazard flood zones include non-residential water-dependent uses that must continue to be located along the riverfront.



Groton, Connecticut

Plan of Conservation and Development

Source:
* Parcels, Street Centerlines, Zoning: Town of Groton GIS Dept.
* Basemap Data: CT DEEP Map & Geographic Information Center (2012)

Index of Coastal Subareas

Legend

Subarea

Coastal Management Area Boundaries

January 2014

This map was developed for use as a planning document. Delineations may not be exact.

Milone & MacBroom

Strategies and Recommendations

One specific recommendation is proposed for this region. The town of Groton should offer to collaborate with the U.S. Navy relative to coastal development on the base. Specifically, the town should work through its existing relationships with Navy Base leadership to ensure that redevelopment occurs in a manner that is sensitive to the protection of water quality along the Thames riverfront, given that the Thames River remains on the State's impaired waters list. This may require review of measures to manage stormwater on the base.

Proposed Land Use and Zone Changes

Changes in land use and zoning are not proposed for the Navy Base.

5.2 West Pleasant Valley

The coastal area associated with West Pleasant Valley lies along the Thames River from Crystal Lake Road to the municipal boundary between the city and town of Groton.

Existing Resources

Coastal resources are of the estuarine embayment category and are relatively uniform because the shoreline of the Thames River is uniform is this neighborhood. A railroad line lies along the shore of the Thames River, and the topography rises steeply from the railroad line to the east.

Coastal Issues and Concerns in the 21st Century

The most significant coastal management issue is that redevelopment in West Pleasant Valley proceed in a manner that is sensitive to its close proximity to the Thames River.

Coastal hazard impacts are very limited due to the narrow coastal flood zone and steeply rising topography uphill from the railroad line. Therefore, this area is not a high priority for increasing coastal resilience. The town anticipates that the railroad line ownership will address coastal resilience on its own for its transportation infrastructure.

Public access in West Pleasant Valley is limited to the Nautilus Parklet on the south side of the end of Crystal Lake Road. Additional public access is not likely possible or desirable due to the barrier caused by the railroad line.

Strategies and Recommendations

One specific recommendation is proposed for this region. The town of Groton should ensure that development in West Pleasant Valley occurs in a manner that is sensitive to the protection of water quality along the Thames riverfront, given that the Thames River remains on the State's impaired waters list. This may require review of measures to manage stormwater on the west side of Bailey Hill and in the Estertown Road neighborhood.

Proposed Land Use and Zone Changes

Changes in land use and zoning are not proposed at this time.

5.3 Airport Area

The coastal area addressed in this section reaches from the Groton city line at Plain Creek and Baker Cove to the Poquonock River estuary. The first of the three area plans is centered on the Groton New London Airport. The Groton business park and the Thomas Road corridor are located in this focus area.

Existing Resources

Coastal resources in this region are primarily comprised of estuarine embayments along Baker Cove and the Poquonock River, although small segments of beaches/dunes and tidal wetlands are found along the Poquonock River estuary. The shoreline along the airport is not classified as developed, although it supports airport uses.

Coastal Issues and Concerns in the 21st Century

The most significant coastal management issue is that the airport must remain positioned as an important regional asset while becoming more resilient to coastal hazards. The entire airport and most of the airport industrial park are located within the FEMA SFHA with a coastal base flood elevation of 11 to 13 feet. During the climate change workshops held in Groton, workshop participants identified the following as climate related impacts likely in this area:

- "More frequent flooding that could prevent access to and reduce function of Groton-New London Airport; and
- Sections of Amtrak railroad could flood under certain sea level rise and storm flooding scenarios."

Additionally, the airport industrial park and "Birch Plain Creek/Baker Cove" were specifically identified by workshop participants as vulnerable to climate change impacts such as sea level rise, increased storm frequency, and increased storm intensities.

The previous (2005) and current (2012) editions of the town's hazard mitigation plan include the following recommendations related to the airport and the adjacent Amtrak railroad line:

- "Roadway Elevation and Structural Protection at Groton-New London Airport – Much of the airport lies in the coastal flood hazard area. Elevating the roadway and providing structural flood mitigation could help increase resilience at the facility."

- "Amtrak Bridge Replacements and Drainage Improvements at South Road and Poquonock Road – Poquonnock Road and South Road have underpasses beneath Amtrak high speed rail lines. These low bridges make passage of emergency vehicles difficult under normal conditions. When these areas are flooded, they are not passable and emergency services are forced to take longer routes. Town officials are concerned that problems could also arise with the evacuation of people and getting materials to residents."

The following observations have been made during the development of this municipal coastal program:

- The airport has been subject to a separate master planning effort and is believed to be an important regional transit and business asset.
- A number of private aviation-related businesses and a National Guard facility are located among the state-owned airport buildings.
- The two modes of egress to the airport area are below the FEMA base flood elevation and are subject to flooding; both were flooded during Hurricane Sandy. Of the two, the South Road underpass (at the railroad grade) lies at a lower elevation and it floods frequently from rainfall as well as tidal flooding. Given the complexity associated with correcting the flooding problems at the South Road underpass, the High Rock Road/Tower Avenue access point needs to be as resilient as possible. Elevating portions of High Rock Road and Tower Avenue may be necessary in the future (especially at the creek crossing).
- The small Karen Avenue residential area lies immediately south of the underpass. These residents should be informed about appropriate evacuation procedures via Tower Road and High Rock Road.
- In addition, business park and airport-related traffic will need to be educated about using the appropriate roads to access the area (or evacuate from the area) before and during flood events.
- Hurricane Sandy damaged a Runway 5 safety feature as well as a series of approach lights. Future floods could have similar results. Over time, components of the airport

should be made more resilient to flood damage because much of the ground surface will remain below FEMA base flood elevations.

- Depending on the exact rate of sea level rise, the airport is at long-term risk of losing the southern ends of the runways to daily inundation. Understanding that re-grading a runway is a significant effort, the airport may wish to begin planning for eventually raising these runways.
- State-owned and private buildings in the airport are at risk for flooding. Over time, these buildings should incorporate floodproofing measures.
- The business park road is at risk for shallow flooding, along with some of the buildings in the business park. The school bus lot is at the lowest elevation; therefore the bus company should have plans in place to move buses before coastal storms, as flooded vehicles cause significant water pollution. Some of the business park occupants may wish to consider floodproofing measures.
- Commercial lots on the southeast side of Thomas Road appear underutilized. If these businesses have been flooded, they should be encouraged to relocate. Over time, these properties could be restored to natural conditions and set aside for tidal marsh advancement (tidal marshes are located at the rear toward the creek).

A second key issue for this area is the potential availability of Birch Plain Golf Course for acquisition or protection as open space. In particularly, Section 4.5 notes that this site may be appropriate for eventual advancement of tidal marshes associated with Birch Plain Creek. Note that much of the golf course property is located in the FEMA SFHA and will be increasingly at risk to coastal flooding over time.

Coastal public access is largely not available within this area and is probably not appropriate given the airport security concerns. Therefore, the town must continue to maximize public access elsewhere to offset the lack of public access in this large coastal area. Fortunately, public access is located nearby at the Sparkle Lake open space and the Peruzzotti Boat Launch. Additionally, significant public access is provided west and adjacent to this area in the City of Groton at Bayberry Lane State Boat Launch, Baker Cove Subdivision, Calf Pasture, and Birch Plain Creek Park.

Strategies and Recommendations

Three overarching strategies are proposed for this region:

- The town should continue marketing the airport area for commercial development that is compatible with the airport and the nearby railroad line.
- The Town should develop a comprehensive strategy for increasing coastal resilience of the airport and the airport industrial park. The strategy should include access roads, internal roads, the airport facilities, and industrial park occupants. Recommendations of the hazard mitigation plan should be considered along with other mitigation actions.

- The town should consider securing the Birch Plain Golf Course property from development and set aside open space that can be flooded and will enable marsh advancement.

Numerous individual recommendations are listed on the area plan. Many of these recommendations support the two overarching strategies above.

Proposed Land Use and Zone Changes

Changes in land use and zoning should be considered along the southeast side of Thomas Road. This could facilitate the voluntary relocation of businesses from underutilized commercial and industrial properties for eventual conversion to open space. Tidal marsh advancement may be feasible on these properties. The proposed land use is open space, and the proposed zoning is a class that would most easily facilitate conversion of these properties to open space.

5.4 Poquonock Bridge and Bluff Point

The coastal area addressed in this section reaches from the Poquonock River estuary to Mumford Cove and Fort Hill Brook. It includes parts of the Poquonock Bridge neighborhood and the Bluff Point State Park peninsula, as well as Bushy Point.

Existing Resources

Coastal resources in this region are comprised of estuarine embayments along the Poquonock River and Mumford Cove, but coastal resources are highly variable in other parts of this area. Rocky shorefront is found at Bushy Point, whereas beaches and dunes are found along Bushy Point Beach. Bluff Point contains rocky shorefronts, coastal bluffs, and beaches/dunes. Tidal wetlands are found along Mumford Cove.

Coastal Issues and Concerns in the 21st Century

The need for new public access is not a significant issue for this area. First, public access is located via the Poquonock River Walkway at the Poquonock River estuary. Second, Bluff Point State Park provides significant public access to all state residents. Thus, public access in this area is not lacking.

During the climate change workshops held in Groton, workshop participants identified the following as climate-related impacts likely in this area:

- "Access to state parks such as Bluff Point [and Haley Farm, which is located further east] could be hampered by flooding; and

- Sections of Amtrak railroad could flood under certain sea level rise and storm flooding scenarios."

Additionally, the "Poquonock Bridge" commercial area, Route 117 at Route 1, Route 1 at Poquonock Bridge, and the ecological resources of "Fort Hill Brook/Mumford Cove" were specifically identified by workshop participants as vulnerable to climate change impacts such as sea level rise, increased storm frequency, and increased storm intensities. Some of these areas were included in the airport area discussion of Section 5.3.

Revitalization of the Poquonock Bridge neighborhood and commercial zone in the vicinity of Route 117 is desired by the town.

As noted in Section 4.4, Groton's water pollution control facility is located at the edge of the SFHA and partly in the 500-year coastal flood zone. Risks will increase as sea level rises. Treatment plants are susceptible to power outages, pump failures, overflows, and other issues. Elevating equipment, building floodproofing, and on-site flood walls are the primary means of adapting treatment plants, although the specific attributes of the treatment plant site may offer other means of adaptation.

Section 4.5 notes that several existing open space properties should be evaluated for the feasibility of providing appropriate areas for marsh advancement and then targeted for marsh advancement projects. One of these is Bluff Point State Park.

Strategies and Recommendations

Three specific recommendations are proposed for this region:

- The town should encourage revitalizing the Poquonock Bridge neighborhood and commercial zone, ensuring that redevelopment is resilient to coastal storms.
- Plan for making the town's water pollution control facility resilient by elevating equipment, floodproofing buildings, and using flood walls.
- Encourage the State to provide space for marsh advancement at Bluff Point State Park.

Proposed Land Use and Zone Changes

Changes in land use and zoning are not proposed.

5.5 Mumford Cove and Groton Long Point

The coastal area addressed in this section reaches from Fort Hill Brook and Mumford Cove to Palmer Cove and Eccleston Brook. It includes the Mumford Cove and Groton Long Point neighborhoods, as well as Haley Farm State Park.

Existing Resources

Coastal resources are variable in this region, ranging from the estuary embayments of Mumford Cove and Palmer Cove, including developed shorefronts and beaches/dunes associated with dense residential land uses in Groton Long Point.

Coastal Issues and Concerns in the 21st Century

The most significant coastal management issue in this region is that Groton Long Point becomes more resilient to coastal hazards. Numerous residential properties are located in VE and coastal AE flood hazard zones. In addition to being located in flood zones, residents have risk for compromised egress. The previous (2005) and current (2012) editions of the town's hazard mitigation plan include the following recommendation:

- "Engineering Study of Groton Long Point Road Bridge – The Groton Long Point Road bridge is the only access/egress to the area and utilities pass along the bridge to the Groton Long Point residents. In 2005, Town officials expressed concern because of the sole access/egress as well as the fact that gradual shifting of rip-rap along the bridge could be catastrophic during a major storm. There are approximately 1,200-1,300 persons living in Groton Long Point during the winter months and 3,000 to 4,000 residents in the summer months."

During the climate change workshops held in Groton, workshop participants identified the following as climate related impacts likely in this area:

- "Access to state parks such as Haley Farm could be hampered by flooding; and
- Sections of Amtrak railroad could flood under certain sea level rise and storm flooding scenarios."

Additionally, the Mumford Cove and Groton Long Point neighborhoods, Groton Long Point Road, and the ecological resources of "Fort Hill Brook/Mumford Cove," "Eccleston Brook/Palmer Cove," and the "Groton Long Point Marshes" were specifically identified by workshop participants as vulnerable to climate change impacts such as sea level rise, increased storm frequency, and increased storm intensities.

The town does not anticipate that property owners in Groton Long Point or Mumford Cove will approach Groton town administration about pursuing FEMA funds for acquiring their homes. However, if FEMA funds are used for acquisitions of floodprone or storm-damaged homes, the resulting open space will revert to ownership by the "sub-applicant" [the State is the applicant]. Given the likelihood that the town of Groton would need to step in as the sub-applicant, these sites would then become town-owned open space.

The need for public access is a very important issue for this region. Although public access is provided at Haley Farm State Park near the Mumford Cove neighborhood, the town lacks any public access at Groton Long Point. This is in stark contrast to the numerous access sites provided in Noank that are listed in the next sub-section. Although there are no plans to provide public access to town residents in Groton Long Point, the town may have opportunities to do so in the future if portions of Groton Long Point are mitigated from flood damage using FEMA or other federal funds.

Section 4.5 notes that several existing open space properties in the town should be evaluated for the feasibility of providing appropriate areas for marsh advancement and then targeted for marsh advancement projects. In this region, one of these open space properties is Haley Farm State Park. Section 4.5 also notes that there are areas in Groton where extra space for marsh advancement is desired. Areas that should be evaluated for the feasibility of providing appropriate space for marsh advancement in this region include the land between the Mumford Cove homes and the Amtrak line (zoned residential) on the west side of Palmer Cove and south of Haley Farm State Park; and land at the north end of Palmer Cove near Haley Farm State Park (zoned residential).

During the analysis described below in Section 5.6 and focusing on the Esker Point Park, eroding marsh edges were observed across Palmer Cove and south of the Amtrak line. If erosion continues, the town may consider stabilizing these eroding marsh edges.

Strategies and Recommendations

Several specific recommendations are proposed for this region:

- Access/egress at Groton Long Point Road must be made more resilient to coastal hazards to ensure that residents can leave Mumford Cove and Groton Long Point prior to coastal hazard events, and to ensure that emergency services can reach residents.
- The Town should work with residents of Mumford Cove and Groton Long Point to make residential structures more flood damage resistant through elevations. Alternatively, the town could pursue acquisitions and conversion of the most flood-damaged properties to open space.
- The town should look for opportunities to provide public access to the shoreline in Groton Long Point in the long term.
- The town should encourage the State to provide space for marsh advancement at Haley Farm State Park.
- Areas that should be evaluated for the feasibility of providing appropriate space for marsh advancement in this region include the land between the Mumford Cove homes and the Amtrak line (zoned residential) on the west side of Palmer Cove and south of

Haley Farm State Park; and land at the north end of Palmer Cove near Haley Farm State Park (zoned residential).

- Stabilize eroding marsh edges on the west edge of Palmer Cove south of the Amtrak line.

Proposed Land Use and Zone Changes

Changes in zoning are not proposed, but changes in future land use are needed to set aside land for marsh advancement between the Mumford Cove homes and the Amtrak line on the west side of Palmer Cove and south of Haley Farm State Park; and land at the north end of Palmer Cove near Haley Farm State Park.

The town recognizes that Groton Long Point maintains its own zoning.

5.6 Noank

The coastal area addressed in this section reaches from Palmer Cove and Eccleston Brook to Beebe Cove and Noank Ledyard Road. It includes the Noank neighborhood. The second of the three area plans in this municipal coastal program is the Esker Point region including the town beach and park.

Existing Resources

Coastal resources are variable in this region, ranging from the estuarine embayments of Palmer Cove and Beebe Cove to the modified bluffs and escarpments and the rocky shorefronts associated with the dense residential land uses in Noank. Beaches are present at Esker Point Beach.

Coastal Issues and Concerns in the 21st Century

Noank – The Noank area was specifically identified by climate change workshop participants as vulnerable to impacts such as sea level rise, increased storm frequency, and increased storm intensities.

During the Long Island Sound Task Force public hearing held on August 6, 2012, two marina managers from Groton (representing a total of three marinas located in Noank and Mystic) spoke about coastal hazards. One of them indicated that decks have been raised over the last 60 years to keep up with rising sea level. The second manager indicated that the many unnamed storms and nor'easters have caused more damage than well-known storms like Tropical Storm Irene.

Thus, Noank appears to be vulnerable to coastal hazards just like Groton Long Point, Mumford Cove, and the airport area. However, most of the land area lies at a higher elevation, leaving mainly the perimeter of Noank in coastal flood zones.

Unlike Groton Long Point, Noank offers numerous opportunities for public access to the shore including Tanglewood Park, Esker Point Park, Palmer Court, Main Street Dock, and Spicer Memorial Park. Thus, additional public access is not needed.

The Noank Harbor Management Plan is the only adopted harbor management plan covering a part of Groton. This plan may provide an example to other parts of Groton that may be good candidates for harbor management planning.

Esker Point – Esker Point Beach is the town's primary beach facility. The property includes a small parking lot, a shady picnic area on the peninsula, a coarse sand and gravel beach with a concessions stand and bathroom building, and a small sandy beach on the west side of the parking lot. The beach has an area for boat racks. The peninsula is somewhat armored on its west side, south of the small sandy beach, with riprap and a cobble shoreline. The east side of the peninsula is a wide intertidal zone consisting of cobbles. This cobble "beach" transitions into the main sandy beach at the curve of the property. All of these areas are in FEMA-designated VE zones, elevation 15 feet, with the exception of the driveway/access road running along the spine of the peninsula.

The primary parking lot is much larger and located on the north side of Groton Long Point Road. This part of the park is known as the Esker Point Waterfront Park and has a short paved trail system, picnic tables, and an unpaved gravel boat launch. The banks on either side of the boat launch have eroded, and intermittent portions of the bank to the north of the launch have also eroded. The erosion may be due to occasional high-velocity flow energy (either tidal or associated with upstream flooding) given that the potential for wave action appears low. All of these areas are in FEMA-designated AE zones, elevation 12 feet. Groton Long Point Road is not in a flood zone except where it dips to meet the bridge to Groton Long Point.

Esker Point Beach and Esker Point Waterfront Park are important recreational facilities and also important points of public access to the shoreline along a span of the town's coast that does not include many public access points. Therefore, maintaining the facilities will be important as sea level rises and coastal storms become more frequent or intense.

While Esker Point Waterfront Park is vulnerable to erosion, Esker Point Beach is likely vulnerable to loss of beach sand due to erosion coupled with a lack of a source of sand nearby. Both parts of the town property are vulnerable to inundation during coastal storm surges, and wave action is likely on the south side of the road. The surge from Sandy covered the main beach with water but did not cross Groton Long Point Road. The

eroding shoreline of Esker Point Waterfront Park was inundated but most of the parking lot probably was not.

Esker Point Beach will need to be maintained as a viable beach. This may become increasingly difficult over the long term. As the beach become narrower with rising sea level, the amount of usable space will decrease and the town may wish to identify other locations in the same park for conversion to beach. One possible strategy is to replace the adjacent cobble intertidal zone with a sandy beach. This could be done in connection with future nourishment of the sandy beach. A portion of the picnic area could be set aside as a future beach for the long term, perhaps 50+ years from now, if sea levels continue to rise.

The concessions and bathhouse building is vulnerable to flooding and wave action during coastal storms, and should be maintained as a simple seasonal structure that can be easily cleaned out after floods and storms. If damage becomes repetitive over time, the town may wish to replace the building with an elevated structure on pilings similar to those found at Hammonasset Beach.

Esker Point Waterfront Park is likely not an appropriate location for a sandy beach and swimming access given the potential for tidal currents in the cove between Groton Long Point Road bridge and the railroad bridge. However, boat access should be maintained. Esker Point Waterfront Park should be allowed to flood, but the shoreline should be stabilized to reduce the potential for erosion. There are a number of "bioengineered" shoreline stabilization techniques that could be evaluated for use at the park. The town of Groton should also keep abreast of a number of shoreline stabilization demonstration projects that are underway.

Strategies and Recommendations

Two specific recommendations are associated with this region:

- The Town should work with residents of Noank to make residential structures more flood damage resistant through elevations. Alternatively, the town could pursue acquisitions and conversion of the most flood-damaged properties to open space.
- Utilize the Noank Harbor Management Plan as an example to other parts of Groton for harbor management planning.

In addition, numerous individual recommendations for Esker Point Beach and Esker Point Waterfront Park are listed on the area plan.

Proposed Land Use and Zone Changes

Changes in land use or zoning are not proposed at this time. The town recognizes that Noank maintains its own zoning.

5.7 Mystic

The coastal area addressed in this section reaches from Beebe Cove and Noank Ledyard Road to the upper Mystic River at Interstate 95. It includes the Groton portion of Mystic village, Beebe Pond Park, Sixpenny Island, Spence Point, and Willow Point. Mystic extends into the town of Stonington to the east. The area of Mystic between Park Place (to the north) and the Fort Rachel Marina (to the south) was subject to a focused assessment and resulted in the third area plan in Appendix B.

Existing Resources

Coastal resources are variable in this region but the majority of the shorefront is developed in the downtown Mystic area. Estuarine embayments, tidal wetlands, and modified bluffs and escarpments are also found in this area.

Coastal Issues and Concerns in the 21st Century

Mystic is and will remain a regionally-significant cultural asset. The most significant coastal management issues in Mystic appear to be public access and coastal hazard resilience. Marsh advancement is a lesser issue due to the developed nature of Mystic.

Public access is provided in many discrete locations such as Mystic Shipyard, Fort Rachel Marine, Carijas, the Water Street public dock and boat launch, Randall's Wharf Condominium walkway, Powerhouse Condominium walkway, Mystic Art Association, Steamboat Wharf, and the Gravel Street pumping station. This appears to be a significant number of locations for access. However, very few parking spaces are available for residents to reach these locations, and some of them are difficult to locate and seemingly disconnected from one another. Furthermore, public access is lacking along the entire shoreline of the Mystic River from Interstate 95 to the Gravel Street pumping station.

During the climate change workshops held in Groton, workshop participants identified the following as climate related impacts likely in this area:

- "Sections of Amtrak railroad could flood under certain sea level rise and storm flooding scenarios; and
- Mystic River bridge may experience additional openings for smaller boats as bridge clearance diminishes with sea level rise."

Additionally, the Mystic residential and commercial areas and the Mystic River Bridge were specifically identified by workshop participants as vulnerable to climate change impacts such as sea level rise, increased storm frequency, and increased storm intensities.

The previous (2005) and current (2012) editions of the town's hazard mitigation plan include the following recommendation: "Structure Elevations and Drainage Improvements in Mystic."

The following additional observations were made during the development of this municipal coastal program:

- Residential properties lie along Park Place and Gravel Street. Commercial properties lie along West Main Street. The Steamboat Inn and the Steamboat Wharf Condominiums (three buildings) lie south of West Main Street on the waterfront. To the west, a number of retail and restaurant establishments are located in the area bounded by Steamboat Wharf Road, West Main Street, and Water Street.
- The waterfront properties to the south of the Steamboat Wharf Condominiums include the following in sequence: Mystic Arts Center, The Power House Condominiums, Randalls Wharf Condominiums, Mystic Downtown Marina, Dockmasters Yachting Services, an office building, Bayside Diesel Engines, 37 Water Street (offices), 47 Water Street (offices), and Fort Rachel Marina. A number of houses are located on the west side of Water Street.
- The large number of water-dependent uses in Mystic is impressive, but many of the land uses are not water-dependent. Conversions of residential property to water-dependent uses in unrealistic, but some of the office buildings could have some potential for water-dependent or maritime uses. The town should investigate these opportunities.
- Engineered seawalls and traditional bulkheads are not common in Mystic. Instead, most of the shoreline is protected from erosion with riprap revetments, rock and granite block walls (either stacked or cemented), and combinations of riprap revetments and rock walls. Stacked and cemented rock walls line the Mystic River from Park Place to the Gravel Street pumping station. A pocket of tidal marsh is present on the river side of a wall near the southern end of Park Place.
- The Gravel Street pumping station is protected by a gently sloping concrete block wall.
- Stormwater outfalls were observed in some sections of the walls throughout the Gravel Street area.
- The edge of water is not visible in the vicinity of the Steamboat Wharf Condominiums because the boardwalk is on pilings above the water, but a variety of bulkheads and walls are likely present below the boardwalk.
- A tidal wetland is located at the edge of water on the south side of the southerly Steamboat Wharf Condominium building, adjacent to the Mystic Arts Center parking lot.

- Shoreline protections downstream of the tidal wetland are predominantly riprap revetment and large granite block walls, in contrast to the stacked and cemented rock walls along Gravel Street. Large riprap is found along the Mystic Arts Center property right up to the foundation of the Power House Condominiums. Riprap and granite blocks are located along the Randalls Wharf Condominium property. Granite block walls continue downstream to the 37 Water Street building, merging into smaller rocks and riprap that form the foundation of the building.
- The shoreline is unprotected south of this building where the small boat ramp and dock are located.
- The 47 Water Street building has a similar foundation on smaller rocks and riprap that merges into a more "orderly" granite block wall heading south along a small park. The wall then juts to the west, consisting of riprap at this point, to meet the edge of Water Street. Riprap continues to the south alongside and beneath the boardwalk associated with the Fort Rachel Marina and its public access.
- Designated coastal public access is found at many sites such as the Gravel Street pumping station, along the boardwalk from West Main Street to the Steamboat Wharf Condominiums, at the Randalls Wharf Condominiums, at the Water Street boat ramp and dock, at 47 Water Street, and at Fort Rachel Marina. However, public parking is limited to a few on-street spaces in front of the Emporium building (retail), a parking lot at Mystic Arts Center, and a few other lots near West Main Street. Parking is not available along the southerly part of Water Street.
- While public access is appropriate south of the Gravel Street pumping station, it is non-existent to the north along Gravel Street. The town should take every opportunity to secure limited public access to the edge of water in this area along Gravel Street.
- Addition of a few parking spaces along the southern section of Water Street would be helpful to facilitate public access to the small boat ramp and dock as well as the walkways in the area.
- The surge from Hurricane Sandy reportedly inundated Gravel Street and came into contact with the front yards or fronts of the homes lining the west side of the road; flooded most of Steamboat Wharf Road, the Steamboat Wharf Condominiums, the Steamboat Inn; and flooded many of the retail and restaurant properties between West Main Street, Steamboat Wharf Road, and Water Street. Mystic Arts Center, Power House Condominiums, and Randalls Wharf Condominiums did not appear to be completely flooded. However, all waterfront properties in this study area to the south of Randalls Wharf Condominiums appeared to be flooded, and Water Street was inundated along this same stretch. The Fort Rachel Marina building was not flooded, but its parking areas and docks were.
- Flooding is already a concern in Mystic. Some residential properties appear to be NFIP-compliant (the southern Steamboat Wharf Condominium building) whereas some are not (the other two Steamboat Wharf Condominium buildings). The town must diligently watch for opportunities to require increased compliance by elevating living space above the base flood. The Biggert-Waters Act of 2012 (or any bills that

replace or amend the Act) will greatly increase flood insurance policies for these condos as policies shift from subsidized to actuarial rates.
- Non-residential properties have a greater number of choices to be flood damage resilient, such as elevating structures and floodproofing. These should be pursued by businesses as needed.

Depending on the exact rate of sea level rise, parts of Mystic are at long-term risk for frequent flooding, including flooding at certain high tides that are not associated with coastal storms. Also, the various riprap revetments and stacked rock walls will be overtopped more in the future. Although day-to-day wave energy is not likely to increase, these "structures" could be more prone to failure as they spend more time wet or overtopped. It is possible that engineered structures may be necessary along some parts of the shoreline as revetments and rock walls continue to age and start to fail. As shoreline protection structures are replaced, the designs should be informed by future sea level projections.

Section 4.5 of this document notes that there are areas in Groton where extra space for marsh advancement is desired. An area that should be evaluated for the feasibility of providing space for marsh advancement in Mystic consists of a group of parcels on the east side of Noank Road north of the intersection with Cedar Road. These properties are zoned residential and are largely developed, but there may be rear lot space for marsh advancement.

Strategies and Recommendations

Several overarching recommendations are proposed for Mystic:

- The town should establish enhanced connectivity between public access sites in Mystic while providing improved directions, signage, and parking.
- The town should work with residents of Mystic to make free-standing residential structures more flood damage resistant through elevations and make condominiums less exposed to increasing NFIP insurance premiums by converting lower levels to floodable spaces.
- The town should work with business owners to make non-residential structures more flood damage resistant through wet and dry floodproofing and elevations.
- The town should reduce the number of stormwater outfalls at the edge of coastal waters when other stormwater management opportunities arise.
- Revetments and rock walls north and south of Route 1 through the entire Mystic area may require new designs and replacement as they remain vulnerable and increasingly at risk to failure from coastal hazards. The town should work with owners of these walls to determine the best course of action for vulnerable sections.
- The Town should consider elevating portions of River Road to the extent needed to ensure northward emergency access and egress for residents.

Numerous individual recommendations are listed on the area plan. Many of these recommendations support the overarching strategies above.

Proposed Land Use and Zone Changes

Changes in land use or zoning are not proposed.

5.8 Old Mystic

The coastal area addressed in this section lies along the upper Mystic River from Interstate 95 to Whitford Brook, which is the Stonington town line. This area generally coincides with the Old Mystic neighborhood. Old Mystic extends into the town of Stonington to the east.

Existing Resources

Coastal resources in this region are dominated by the estuarine embayment of the Mystic River. Tidal wetlands are found along parts of the estuary.

Coastal Issues and Concerns in the 21st Century

The most significant coastal management issues in Old Mystic are public access, coastal hazard resilience, and tidal marsh advancement. The Mystic River Bridge (at the head of the river) was specifically identified by climate change workshop participants as vulnerable to impacts such as sea level rise, increased storm frequency, and increased storm intensities.

Public access is provided at the Mystic River state boat launch beneath Interstate 95. Additional public access is desirable to the north.

Section 4.5 notes that there are areas in Groton where extra space for marsh advancement is desired. An area that should be evaluated for the feasibility of providing appropriate space for marsh advancement in this region is the land at the head of the Mystic River that is zoned residential.

Strategies and Recommendations

Three specific recommendations are proposed for this region:

- The Town should establish new public access north of the boat launch.
- The Town should consider elevating portions of River Road to the extent needed to ensure emergency access and egress for residents.

- Residentially-zoned parcels at the head of the Mystic River should be set aside for marsh advancement.

6.0 PLAN IMPLEMENTATION

Numerous municipal departments and commissions will be responsible for pursuing the strategies and implementing the recommendations of this plan. These are listed in Table 6-1. Some recommendations will benefit from cooperation between more than one departments and/or commissions.

The Plan of Conservation and Development was developed simultaneously with the update of this municipal coastal program. However, as additional Town of Groton plans are updated, it will be necessary to carry forward some of the strategies and recommendations of this municipal coastal program. Likely candidates for incorporation of elements of this municipal coastal program are the Parks and Recreation Master Plan (if it is updated) and the Groton portion of the Southeastern Connecticut Hazard Mitigation Plan (when it is updated in 2016-2017).

One of the recommendations of this municipal coastal program is to develop a townwide Harbor Management Plan or smaller-scale harbor management plans for areas such as Mystic. When these plans are developed, they should incorporate elements of this municipal coastal program.

The responsibility for updating and developing other plans will lie with the commissions charged with the updates.

TABLE 6-1
IMPLEMENTATION

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
2.0 OVERVIEW OF APPLICABLE REGULATIONS		
State of Connecticut	Incorporate sea level rise and coastal resilience concepts to POCD per Public Act 12-101	Planning Department and Planning Commission
	Look for opportunities to support or implement living shoreline projects per Public Act 12-101	Planning Department and Conservation Commission
	Utilize the new CT Center for Coasts to tap into potential planning and technical resources	Planning Department
Noank	Offer to collaborate with Noank relative to review of coastal development projects	Planning Department and Planning Commission
United States Navy	Offer to collaborate with the U.S. Navy relative to coastal development on the base	Planning Department and Planning Commission
3.0 PLANNING DOCUMENTS RELATED TO COASTAL MANAGEMENT		
State of Connecticut	Incorporate parts of Growth Management Principle #4 from the Connecticut Conservation and Development Policies Plan to the POCD	Planning Department and Planning Commission
Noank Harbor Management Plan (1992)	Develop additional Harbor Management Plans for Groton, or a townwide Harbor Management Plan	Planning Department and Harbor Management Commission
Parks and Recreation Master Plan (2009)	Pursue additional public access to the water	Planning Department, Planning Commission, and Parks and Recreation Department
	Expand boating facilities at Spicer Park	Parks and Recreation Department and Parks and Recreation Commission
	Develop a master plan for Esker Point Beach and Park	Planning Department, Planning Commission, Parks and Recreation Department, and Parks and Recreation Commission

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
Preparing for Climate Change (2011)	Incorporate strategies from the Preparing for Climate Change report to the POCD	Planning Department and Planning Commission
Southeastern Connecticut Hazard Mitigation Plan (2012)	Incorporate strategies from the Hazard Mitigation Plan to the POCD per the federal Disaster Mitigation Act of 2000	Planning Department and Planning Commission
4.0 COASTAL MANAGEMENT ISSUES		
Sea Level Rise and Coastal Resilience	Adopt freeboard for stronger flood mitigation	Planning Department and Zoning Commission
	Adopt V Zone standards in Coastal A Zones for stronger flood mitigation	Planning Department and Zoning Commission
	Acquire storm-damaged properties and convert to open space	Town Manager and Town Council
	Consider establishing a future sea level overlay zone to require alternate development standards within this overlay zone [refer to document for possible standards]	Planning Department and Zoning Commission
	Consider utilizing rolling easements to achieve coastal realignment	Planning Department, Planning Department, and Zoning Commission
	Repair hard shoreline structures as needed to keep up with sea level rise	Public Works Department
	Pursue living shoreline projects to restore eroded tidal marshes and provide protection	Planning Department, Public Works Department, and Conservation Commission
	Elevate roads as needed to keep up with sea level rise	Public Works Department
	Mitigate key access/egress to reduce flooding and establish alternate egress when needed	Public Works Department and Emergency Management Department
	Pursue flood mitigation at sewer pumping stations	Public Works Department
	Pursue flood mitigation at the water pollution control facility	Public Works Department
Tidal Wetlands	Encourage marsh advancement at existing open space such as Sparkle Lake, Bluff Point, and Haley Farm	Planning Department and Conservation Commission
	Secure additional lands for marsh advancement such as	Planning Department, Conservation

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	Birch Plain Golf Course, the southeast side of Thomas Road, and other areas listed in the municipal coastal program	Commission, and Town Council
Water-Dependent Uses	Relocate water-dependent uses to previously water-dependent properties in Mystic when possible	Planning Department, Planning Department, and Zoning Commission
Public Access	Establish new public access to the water when possible	Planning Department, Planning Commission, and Parks and Recreation Department
	Secure the ends of dead-end roads as public access when they end at the shoreline	Planning Department, Planning Commission, and Parks and Recreation Department
	Secure additional parking spaces for the numerous public access locations in Mystic	Planning Department and Public Works Department
	Make improvements to Esker Point Beach and Park	Planning Department, Parks and Recreation Department, and Parks and Recreation Commission
Water Quality	Review the coastal TMDL Plans as they are developed and look for opportunities to support the state's efforts to improve water quality	Planning Department and Public Works Department
	Modify and improve stormwater management to reduce the direct discharge of stormwater to coastal waters	Planning Department and Public Works Department
	Pursue stormwater management strategies (such as those listed in the DWQMP) throughout the town, including inland sites, because Groton's watercourses drain to coastal waters	Planning Department and Public Works Department
Buffers and Setbacks	Continue to require compliance with the Coastal Resource Setback of 50 feet	Planning Department and Planning Commission
	Require vegetated buffers during the CSPR process	Planning Department and Planning Commission
	Consider sliding-scale setbacks if the need arises in the future to address very small or large lots	Planning Department and Planning Commission
Density and Views	Continue to protect views using the Zoning Regulations and CSPR process	Planning Department and Planning Commission

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	Consider strengthening protection of views in the future if threats to views appear to increase going forward	Planning Department, Planning Commission, and Zoning Commission
Open Space and Coastal Land Acquisitions	Acquire land for marsh advancement and public access	Planning Department, Conservation Commission, and Town Council
	Secure land through conservation easements or other methods for marsh advancement and public access	Planning Department, Conservation Commission, and Town Council
	Acquire private properties using FEMA mitigation funds when they are available	Planning Department, Conservation Commission, and Town Council
Program Administration	Consider establishing a coastal resources management overlay zone with the coastal boundary as the overlay zone boundary	Planning Department, Planning Commission, and Zoning Commission
	Consider reducing exemptions from the CSPR process if they appear to pose risks to resources or decrease coastal resilience	Planning Department, Planning Commission, and Zoning Commission
	Consider requiring that development applicants describe coastal benefits when proposing projects that are reviewed through the CSPR process	Planning Department, Planning Commission, and Zoning Commission
5.0 GEOGRAPHIC CONDITIONS, ISSUES, & RECOMMENDATIONS		
Navy Base	Offer to collaborate with the U.S. Navy relative to coastal development on the base	Planning Department and Planning Commission
West Pleasant Valley	Ensure that development occurs in a manner that is sensitive to the protection of water quality along the Thames riverfront	Planning Department and Planning Commission
Airport Area	Continue marketing the airport area for commercial development that is compatible with the airport and the nearby railroad line	Airport Advisory Committee and Community Development Advisory Committee
	Develop a comprehensive strategy for increasing coastal resilience of the airport and the airport industrial park. The strategy should include access roads, internal roads,	Airport Advisory Committee, Community Development Advisory Committee, Planning Department, Planning Commission, Public

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	the airport facilities, and industrial park occupants. Recommendations of the hazard mitigation plan should be considered along with other mitigation actions.	Works Department, Emergency Management Department, and others
	Consider securing the Birch Plain Golf Course property from development and set aside open space that can be flooded and will enable marsh advancement.	Planning Department and Conservation Commission
	Modify zoning and proposed land use along Thomas Road to encourage business relocation and tidal marsh advancement.	Planning Department, Planning Commission, and Zoning Commission
	Pursue strategies on the Airport Area Plan: 1. Reduce the risk of road closures at the Poquonock River bridge at Route 1 and the Poquonock Road and South Road railroad track underpasses during future floods 2. Work with CTDOT and Amtrak to eliminate the South Road underpass 3. Develop neighborhood evacuation plan for South Road residences (Orchard Street and Karen Avenue) 4. Ensure that fuel storage and potential hazardous materials are flood damage resistant at the Tilcon site 5. Support future aviation-related development per the airport master plan 6. Consider floodproofing state and private buildings in the airport 7. Ensure that airport fueling areas are flood damage resistant 8. Consider teaming with CTDOT for marsh advancement demonstration project along the Poquonock River estuary 9. Repair airport runway safety features damaged by Hurricane Sandy	Airport Advisory Committee, Community Development Advisory Committee, Planning Department, Planning Commission, Parks and Recreation Department, Parks and Recreation Commission, Public Works Department, Emergency Management Department, and others

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	10. Develop school bus relocation plan for use before coastal storms 11. Consider floodproofing for existing businesses in the business park and ensure that new buildings are elevated or Floodproofed 12. Ensure that the Tower Avenue sewer pumping station is flood resilient 13. Consider acquiring land and relocating businesses from Thomas Road to allow marsh advancement 14. Elevate sections of High Rock Road and Tower Avenue as needed to keep up with rising base flood elevations	
Poquonock Bridge and Bluff Point	Encourage revitalizing the Poquonock Bridge neighborhood and commercial zone, ensuring that redevelopment is resilient to coastal storms.	Community Development Advisory Committee, Planning Department, and Planning Commission
	Plan for making the town's water pollution control facility resilient by elevating equipment, floodproofing buildings, and using flood walls.	Public Works Department
	Encourage the State to provide space for marsh advancement at Bluff Point State Park.	Planning Department and Conservation Commission
Mumford Cove and Groton Long Point	Access/egress at Groton Long Point Road must be made more resilient to coastal hazards to ensure that residents can leave Mumford Cove and Groton Long Point prior to coastal hazard events, and to ensure that emergency services can reach residents.	Public Works Department and Emergency Management Department
	Work with residents of Mumford Cove and Groton Long Point to make residential structures more flood damage resistant through elevations. Alternatively, the town could pursue acquisitions and conversion of the most flood-damaged properties to open space.	Planning Department
	Look for opportunities to provide public access to the	Planning Department, Conservation

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	shoreline in Groton Long Point in the long term.	Commission, and Parks and Recreation Commission
	Encourage the State to provide space for marsh advancement at Haley Farm State Park.	Planning Department and Conservation Commission
	Evaluate the feasibility of providing appropriate space for marsh advancement include the land between the Mumford Cove homes and the Amtrak line (zoned residential) on the west side of Palmer Cove and south of Haley Farm State Park; and land at the north end of Palmer Cove near Haley Farm State Park (zoned residential). Change the future land uses on these parcels.	Planning Department, Planning Commission, and Conservation Commission
	Stabilize eroding marsh edges on west edge of Palmer Cove.	Conservation Commission and Public Works Department
Noank	Work with residents of Noank to make residential structures more flood damage resistant through elevations. Alternatively, the town could pursue acquisitions and conversion of the most flood-damaged properties to open space.	Planning Department
	Utilize the Noank Harbor Management Plan as an example to other parts of Groton for harbor management planning.	Harbor Management Commission
	Pursue strategies on the Esker Point Area Plan: 1. Upgrade Groton Long Point Road bridge and elevate road to keep up with rising sea level and base flood elevation 2. Add resilient amenities to Esker Point Park such as playgrounds, picnic shelters, and interpretive signage 3. Maintain boat ramp at Esker Point Park 4. Stabilize eroding shoreline at Esker Point Park 5. Stabilize eroding marsh edges [Mumford Cove/GLP strategy – see above]	Community Development Advisory Committee, Planning Department, Planning Commission, Parks and Recreation Department, Parks and Recreation Commission, Public Works Department, and others

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	6. Improve circulation in the Esker Point Park parking lot while adding landscaped islands to delineate spaces and reduce impervious surfaces; and consider replacing asphalt with pervious parking surfaces 7. Floodproof or elevate bathhouse and remodel or improve the exterior 8. Renourish the west side of the esker point with sand as needed 9. Consider development of a sand beach on the west or east side of the esker point, subject to a determination that longshore migration will not adversely impact other areas	
Mystic	Establish enhanced connectivity between public access sites in Mystic while providing improved directions, signage, and parking.	Community Development Advisory Committee, Planning Department, Planning Commission, Parks and Recreation Department, Parks and Recreation Commission, Public Works Department, and others
	Work with residents of Mystic to make free-standing residential structures more flood damage resistant through elevations and make condominiums less exposed to increasing NFIP insurance premiums by converting lower levels to floodable spaces.	Planning Department
	Work with business owners to make non-residential structures more flood damage resistant through wet and dry floodproofing and elevations.	Planning Department
	Reduce the number of stormwater outfalls at the edge of coastal waters when other stormwater management opportunities arise.	Public Works Department
	Revetments and rock walls north and south of Route 1 through the entire Mystic area may require new designs	Planning Department and Public Works Department

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	and replacement as they remain vulnerable and increasingly at risk to failure from coastal hazards. The town should work with owners of these walls to determine the best course of action for vulnerable sections.	
	Consider elevating portions of River Road to the extent needed to ensure northward emergency access and egress for residents.	Public Works Department and Emergency Management Department
	Pursue strategies on the Mystic Area Plan: 1. Consider car-top boat access at the end of Park Place 2. Identify opportunities to secure limited public pedestrian access to the edge of the water along Gravel Street between Eldridge Street and Route 1 3. Repair small potholes near tops of the block and stone walls and reduce the number of stormwater outfalls when other stormwater management opportunities arise 4. Revetments and rock walls north and south of Route 1 through the entire Mystic area may require new designs and replacement as they remain vulnerable and increasingly at risk to failure from coastal hazards 5. Elevate residential buildings with consideration of sea level rise projections 6. Ensure that the Gravel Street sewer pumping station is flood resilient 7. Consider elevating or floodproofing structures in the central business district 8. As NFIP premiums convert to actuarial rates, work with condominium associations to facilitate conversion of lower living spaces to floodable spaces	Community Development Advisory Committee, Planning Department, Planning Commission, Parks and Recreation Department, Parks and Recreation Commission, Public Works Department, and others

Municipal Coastal Program Section	Strategies for Coastal Management	Responsible Department or Commission
	9. Work with the Mystic Arts Center to design and construct a sustainable shorelines demonstration project 10. Identify opportunities to secure public parking spaces for people utilizing coastal access sites 11. Encourage water-dependent or maritime uses in office buildings on properties that were formerly water-dependent uses 12. Wet floodproof and dry floodproof nonresidential buildings with the design elevation selected in consideration of sea level rise projections	
Old Mystic	Establish new public access north of the boat launch.	Planning Department, Planning Commission, and Parks and Recreation Department
	Consider elevating portions of River Road to the extent needed to ensure emergency access and egress for residents.	Public Works Department and Emergency Management Department
	Residentially-zoned parcels at the head of the Mystic River should be set aside for marsh advancement.	Planning Department and Conservation Commission

Appendix A
Recommendations from the Previous Municipal Coastal Program

STATUS OF RECOMMENDATIONS FROM
PREVIOUS MUNICIPAL COASTAL PROGRAM

A.	**NON-REGULATORY MEASURES**	**Status**
1.	Encourage the harbormasters, in conjunction with the town, to develop an improved mooring system along the Mystic River in order to ensure safe public access along existing navigation channels.	Uncertain
2.	In order to preserve water quality in coves, sewage pumping stations should be protected to prevent flows of sewage into the coves during possible breakdowns in the system.	Uncertain
3.	The town should conduct discussions with the Department of Health Services to develop a time table to reopen shellfish beds in the town.	Complete
4.	The town, in cooperation with the Water Pollution Control Authority, should develop a program to test septic systems of existing developments along the shoreline to determine whether any are leaking into the coves. Where feasible, inefficient systems should be required to tie into the sewer system. In addition, regular checks on septic systems to ensure reduced pollution should become standard procedure along the shoreline.	Complete
5.	The town should actively pursue a plan to control and regulate dredging and filling of the coves and coastal waters through discussions with the Department of Environmental Protection and the Army Corps of Engineers.	Not complete
6.	Enlarge existing waterfront access points in the town where feasible by acquiring suitable sites for waterfront parks and/or beaches. The town should be constantly alert to any possible sites that become available.	Complete (and ongoing)
7.	The Chairperson's committee should become involved in the planning of the development of the U.S.S. Nautilus as a tourist attraction.	Complete
8.	The Town Planning Department should discuss any plans that the Department of Environmental Protection may have to modify existing land use at Bluff Point State Park and Haley Farm State Park.	Complete
9.	The town should hold discussions with the transit district in order to provide transportation to coastal recreation and tourist areas during the summer.	Not complete
10.	The waterfront along the Thames River between the railroad and the river could be developed in the future for water-dependent uses. The feasibility of using this land for such a purpose is beyond the scope of this study; however, the area should be studied for future consideration.	Complete (partial)
11.	The town should develop a waterfront identification program to maximize use of waterfront areas.	Complete
B.	**REVISIONS TO THE PLAN OF DEVELOPMENT**	**Status**
1.	The development of the U.S.S. Nautilus as a tourist area on the Thames waterfront is likely to have a major impact in the area. It is therefore suggested that the area immediately adjacent to the new development be designated tourist commercial in order to reflect the future development in the area.	Complete

2.	The area in which the Odd Fellows Home is located is designated recreation and open space. If this area is developed in the future, it would provide an opportunity to help meet the demand for residential development along the coast without causing any adverse impacts on sensitive coastal resources. Therefore, it is recommended that the area be designated moderate density development.	Complete
3.	The area west of the airport is designated natural resources, but the only sensitive part of the area is the land adjacent to Birch Plain Creek, designated recreation and open space. The non-sensitive area should be designated industrial, along with other land adjacent to Thomas Road, excluding the tidal wetland area.	Complete (tidal wetlands are zoned Industrial)
4.	The area at the southern corner of High Rock Road and Poquonock Road, presently designated moderate density residential in the Plan of Development, and zoned commercial, should be considered for professional office designation. This modification would be consistent with the concept of centralizing commercial uses in the downtown area.	Complete
5.	The large tract north of Trail's Corner which is designated natural resources appears to be mislabeled since a natural resource designation does not denote future land use designation. It is recommended that the area be changed to moderate density residential on the Plan of Development.	Complete (current a school)
6.	The area designated as moderate density residential, located south of the intersection of Tower Avenue and High Rock Road, should be redesignated to reflect current use and its proximity to the airport industrial complex. Therefore, it is recommended that this area be redesignated to industrial.	Complete
7.	The area north of Lilly Lane and southeast of Fort Hill Homes is moderate density residential and should be reconsidered for townhouse residential. This would allow an alternative form of housing at a density which is consistent with the Fort Hill area.	Not completed, but developed as duplexes
8.	The area east of Depot Road and north of Industrial Drive is inappropriately designated open space because it has not been slated for acquisition by the town. Therefore, it should be designated as moderate density to conform with the Fort Hill area.	Complete
9.	The area north of Mumford Cove Estates and south of the railroad line should be redesignated from natural resource to recreation and open space so that it is preserved as per the original subdivision plan.	Not complete
10.	Two large waterfront commercial areas, one on West Cove and the other on the Mystic River side of the peninsula, are designated on the current Plan of Development as general commercial. A new designation, marine commercial/recreation, appears to be more suitable since it pertains to waterfront uses. The marine commercial/recreational designation is defined as: Those uses and facilities which require access to marine or tidal waters and which cannot be reasonably located inland, including, but not limited to: marinas, recreational and commercial fishing and boating facilities, commercial finfish or shellfish processing plants, waterfront docks, boatbuilding facilities, other commercial-recreational uses dependent upon waterborne transportation, and uses which provide general public access to coastal waters.	Complete – now WC
11.	The area currently designated as waterfront design district on Willow Point should be reclassified as a new category, marine commercial/recreation.	Complete – now WF
12.	In Mystic, expand the area currently designated waterfront design district to include the commercial	Complete

	frontage north of Main Street, the existing marina south of Fort Rachel Place/Water Street, and the railroad embankment. In the first two instances, this will make the Plan of Development consistent with present zoning and existing land use patterns.	
13.	The following be added to open space land objectives in the Plan of Development. Preserve tidal wetland areas as open space. This designation qualifies the owner for special tax considerations under PA-490 if land is maintained as open space. Plan of development changes will be considered in the future for Noank and the airport industrial area.	Complete
C.	**REVISIONS TO THE ZONING REGULATIONS**	**Status**
1.	In order to control new development around the U.S.S. Nautilus, which is expected to become a major tourist attraction in the coastal area, a new zone (tourist commercial) should be established which will regulate the type of development in the area.	Complete
2.	The area at the northern corner of High Rock Road and Poquonock Road presently zoned CA-12 should be zoned OMF (Office Multi Family) which allows one and two-family housing, multi-family uses as well as professional offices. This revision has been referred to the Zoning Commission for formal consideration and public hearing.	Complete
3.	A small area to the west of the Poquonock River is zoned commercial, CB-15. Its present land use is single family development and a truck depot. The zoning should be changed to moderate density residential to reflect present development. During the Phase II work, it was learned that a public hearing concerning a similar zone change proposed in this area was conducted and the owners of the property objected to a proposed change to the present zoning designation. In light of this event it is felt that the proposed coastal resource setback requirements in Revision 8 herein are probably adequate to protect the abutting coastal resource.	Not complete
4.	The northern section of Bluff Point State Park is zoned industrial, IC-40. The area is not suitable for industrial development and is part of the state park and should therefore be changed to low density residential with a suggested density of 120,000 square feet per lot. It is important for the local Plan of Development and Zoning Regulations to reflect the town's intended use of property. As Bluff Point is a critical recreation and open space resource within the town, its zoning should reflect that circumstance. The recommendation should be broadened to include the southern part of Bluff Point State Park, which is currently zoned RS-20 to be included in a new RS-120 zone. Another option under consideration by the Planning Commission is to designate the area an open space zone. When a determination of which approach is most beneficial to the town is made, it will be forwarded to the Zoning Commission for consideration.	Not complete
5.	The area along the west side of the Mystic River north of I-95 is zoned residential, RU-20, which allows development on half-acre lots. As the area is not served by the sewer system and there are no plans to	Complete

	extend it to the area, the area should be rezoned to permit only large lot development, for example 80,000 square feet in accordance with environmental limitations and on-site septic systems. This recommendation has been forwarded to the Zoning Commission for consideration and public hearing.	
6.	The area north of Lily Lane and southeast of Fort Hill Homes is moderate density residential and should be reconsidered for townhouse residential. This would allow an alternative form of housing at a density which is consistent with the Fort Hill area. This proposal has been forwarded to the Fort Hill Community Development Committee for reaction before being acted upon by the Planning Commission.	Not complete
7.	New development in the coastal zone should pay careful attention to sensitive coastal resources. Therefore, additional safeguards should be added to the zoning regulations requiring greater setbacks from the water's edge and wetlands than presently exist in exchange for greater flexibility in siting structures on a particular parcel. A proposed Coastal Resource Setback amendment to the Zoning Ordinance follows. It is felt that in those instances where the setback requirement renders a property unbuildable because of the additional requirement that this constitutes a hardship under the regulations and, therefore, the Zoning Board of Appeals can legitimately remedy such situations. However, in reviewing the zoning map, it appears that these situations should occur infrequently and that this method tampers least with the requirements of each zone classification while providing a means of protecting the natural resource. This revision has been forwarded to the Zoning Commission for consideration and public hearing. In the Phase I period of the MCP, it was indicated that areas adjacent to Birch Plain Creek and Town Open Space (the Johl property) are zoned industrial, IA-40. In order to protect the sensitive resources, it was proposed the area should be rezoned to low density residential. In reviewing this recommendation during the Phase II period and in light of the proposed requirements of a coastal resource setback requirement and with town ownership of the Johl property, it is now felt that adequate protection of Birch Plain Creek can be achieved through the additional setback requirements proposed herein and with existing regulations and coastal site plan review. Therefore, the Planning Commission has determined that the existing zoning designations can be retained and the objective of protecting the sensitive resources can be achieved through the adoption of the coastal resource setback.	Partly complete (Coastal Resource Setback adopted)
8.	Preservation of physical and visual access to the water can be marred by insensitive development. New development adjacent to the water should be required to maintain a percentage of open space through amendments to the Zoning Regulations. Upon further study in Phase II, it is now felt that this objective can be achieved through use of the existing Coastal Site Plan Review procedures and, therefore, no new revisions are proposed.	Complete

	In the instance of the Mystic River Waterfront Design District, Design Objective (i) should be broadened to encourage pedestrian access to the river's edge from the Main Street bridge south to the railroad bridge. This objective will provide a specific basis for pursuit of the boardwalk concept. A new Section 6.34(j) should be added as follows: The applicant shall demonstrate how the proposed site plan achieves the objectives of provision of pedestrian access to the riverfront and preserve visual access, where feasible and appropriate. This language is contained in Chapter VII.	Complete Complete
9.	In commercial and industrial uses, control of discharge of hazardous materials and industrial wastes should be regulated under the Zoning Ordinance. The Commission felt this to be an important addition to the regulations in light of the recent Johnson Hardware experience and its resultant pollution of the Poquonock River. It has been referred to the Zoning Commission for consideration and is proposed to apply town wide.	Complete
10.	Requirements of Coastal Site Plan Review should be incorporated into the Zoning Regulations. The attached language contained is extracted from Section 11 of the CAM Act and defines the requirements and applicability of Coastal Site Plan Review. It is meant to replace the existing Section 8.61-3. These revisions will be held until the new State model exemption regulation is received. The exemption section will be rewritten to clarify that structures within the proposed 50' setback and the Waterfront Design District remain subject to site plan review.	Complete
11.	Revisions to the Waterfront Design District in Mystic are contained in Chapter VII. These proposals have been forwarded to the Zoning Commission for consideration and public hearing.	Complete
NEXT STEPS		**Status**
The following items are identified for future study		
1.	The need for an adequate town beach site with suitable access, parking, water quality, and shoreline conditions has been evident for years, and identifying such a site is of major concern to the town. Specifically, the issue of suitable access to the Old Town Beach on the Poquonock River, improvements to the New Town Beach at Bluff Point, and the search for new areas should be studied intensively.	No progress
2.	The Noank Village peninsula, which has many unique characteristics and issues, should be examined in more detail concerning its future land use.	No progress
3.	The shorefront area north of I-95 along the Thames River warrants further study as possible development for marine-related uses and possible use as a dredge material containment area.	No progress
4.	A feasibility and impact study of an area in the town or city for siting of a Resource Recovery, Waste to Energy Facility to help meet area solid waste disposal needs.	Complete (facility in a different town)

5.	A study of the possible use of the abandoned Mystic River Railroad Bridge embankment for recreational waterfront use.	No progress
6.	A study of the Birch Plain Creek estuary system concerning impacts of the town and city development on the ecology, hydrology, and biological productivity of the system.	No progress
7.	Development of a Bluff Point Management Study and Program.	No progress
8.	Study the feasibility of establishing a linear park along the Thames River in an attempt to link the Nautilus Memorial with Thames Street.	No progress
9.	Study the feasibility of establishing a linear park along the Poquonock River from Route 1 to Bluff Point.	Complete
10.	Develop a comprehensive inventory of all public water access points within the town and their present and future value as public access areas.	Complete

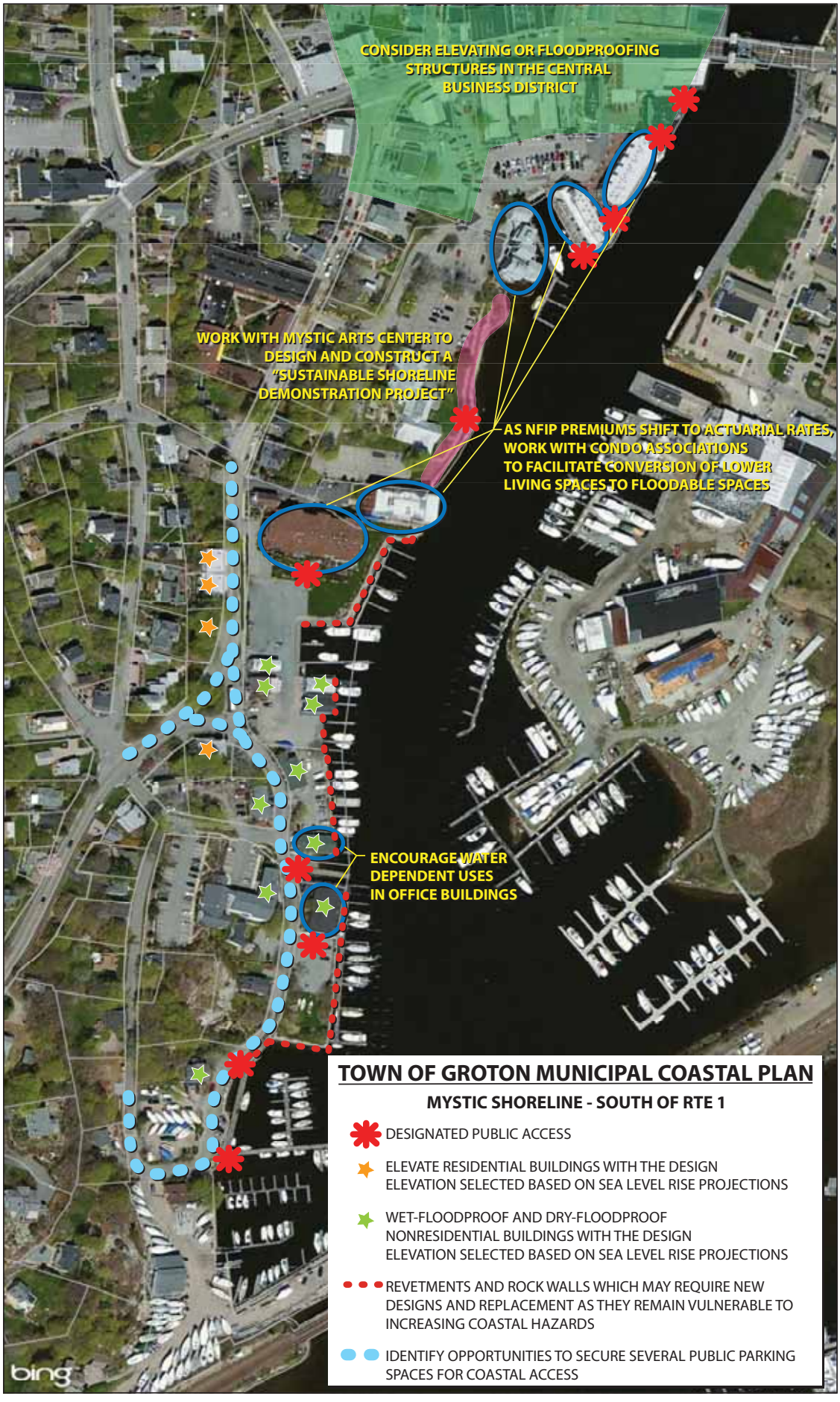
Appendix B
Area Plans for Airport, Esker Point, and Mystic


TOWN OF GROTON MUNICIPAL COASTAL PLAN
GROTON-NEW LONDON AIRPORT AND AIRPORT BUSINESS PARK
REDUCE THE RISK OF ROAD CLOSURE DURING FUTURE FLOODS (LONG-TERM STRATEGY)
ENSURE THAT FUEL STORAGE AND POTENTIAL HAZARDOUS MATERIALS ARE FLOOD DAMAGE RESISTANT
WORK WITH AMTRAK AND CTDOT TO ELIMINATE UNDERPASS
CONSIDER FLOODPROOFING FOR EXISTING BUSINESSES AND ENSURE THAT NEW BUILDINGS ARE ELEVATED OR FLOODPROOFED
DEVELOP BUS RELOCATION PLAN FOR USE BEFORE COASTAL STORMS
DEVELOP NEIGHBORHOOD EVACUATION PLAN FOR RESIDENTS
ELEVATE SECTIONS OF ROAD AS NEEDED TO KEEP UP WITH RISING BASE FLOOD ELEVATIONS
ENSURE THAT SEWER PUMPING STATION IS RESILIENT TO FLOODS
ENSURE THAT FUELING AREAS ARE FLOOD DAMAGE RESISTANT
SUPPORT FUTURE AVIATION-RELATED DEVELOPMENT PER AIRPORT MASTER PLAN
CONSIDER ACQUIRING LAND AND RELOCATING BUSINESSES TO ALLOW MARSH ADVANCEMENT
CONSIDER FLOODPROOFING STATE AND PRIVATE BUILDINGS
CONSIDER TEAMING WITH CTDOT FOR MARSH ADVANCEMENT DEMONSTRATION PROJECT
REPAIR SAFETY FEATURES
bing

TOWN OF GROTON MUNICIPAL COASTAL PLAN

ESKER POINT BEACH AND ESKER POINT WATERFRONT PARK


TOWN OF GROTON MUNICIPAL COASTAL PLAN
MYSTIC SHORELINE - NORTH OF RTE 1
ELEVATE RESIDENTIAL BUILDINGS WITH THE DESIGN ELEVATION SELECTED BASED ON SEA LEVEL RISE PROJECTIONS
REVETMENTS AND ROCK WALLS WHICH MAY REQUIRE NEW DESIGNS AND REPLACEMENT AS THEY REMAIN VULNERABLE TO INCREASING COASTAL HAZARDS
CONSIDER CAR-TOP BOAT LAUNCH
IDENTIFY OPPORTUNITIES TO SECURE LIMITED PUBLIC PEDESTRIAN ACCESS TO THE EDGE OF THE WATER
REPAIR SMALL POTHOLES NEAR TOPS OF THE WALLS AND REDUCE THE NUMBER OF STORMWATER OUTFALLS WHEN OTHER STORMWATER OPPORTUNITIES ARISE
PROTECT PUMPING STATION FROM COASTAL HAZARDS
CONSIDER ELEVATING OR FLOODPROOFING STRUCTURES IN THE CENTRAL BUSINESS DISTRICT



TOWN OF GROTON MUNICIPAL COASTAL PLAN

MYSTIC SHORELINE - SOUTH OF RTE 1

- DESIGNATED PUBLIC ACCESS
- ELEVATE RESIDENTIAL BUILDINGS WITH THE DESIGN ELEVATION SELECTED BASED ON SEA LEVEL RISE PROJECTIONS
- WET-FLOODPROOF AND DRY-FLOODPROOF NONRESIDENTIAL BUILDINGS WITH THE DESIGN ELEVATION SELECTED BASED ON SEA LEVEL RISE PROJECTIONS
- REVETMENTS AND ROCK WALLS WHICH MAY REQUIRE NEW DESIGNS AND REPLACEMENT AS THEY REMAIN VULNERABLE TO INCREASING COASTAL HAZARDS
- IDENTIFY OPPORTUNITIES TO SECURE SEVERAL PUBLIC PARKING SPACES FOR COASTAL ACCESS